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OCTOBER 1933

Journal of Educational Research

Registered June 4 1929

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THE JOURNAL OF EDUCATIONAL RESEARCH is indexed in the Education Index

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JOURNAL OF EDUCATIONAL RESEARCH

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THE JOURNAL OF EDUCATIONAL RESEARCH is published at Bloomington, Illinois, monthly, except June, July, and August by the Public School Publishing Company. The subscription price is $3.50; $3.50 in Canada or Mexico; and $3.90 in other foreign countries.

Subscriptions and all communications about reprints or other business matters should be addressed to the PUBLIC SCHOOL PUBLISHING COMPANY, at Bloomington, Illinois.

Address all communications on editorial matters to A. S. Barr, Department of Education University of Wisconsin, Madison, Wisconsin.

JOURNAL *of* EDUCATIONAL RESEARCH

Volume XXVII OCTOBER, 1933 Number 2

TESTS FOR THE TENDENCY TO REVERSAL IN READING

LORENE TEEGARDEN
Washington, D. C.

STUDIES made by psychologists, educators, and physicians have shown that an important factor in the problem of the non-reader is the tendency to confuse symbols, both as regards their position and their sequence. By the non-reader is meant the child of normal intelligence and vision who, under the usual school instruction, does not learn to read above first or second grade level. Such individuals are often found in the third, fourth, or fifth grade, doing poor or failing work, though they are likable, apparently normal in general comprehension, and often interested in many activities.

The non-reader has attracted much attention. Studies of individuals suffering from reading disability, and of methods used in teaching them, have been reported by able investigators. Few inquiries, however, have been made into the early stages of the condition.

Orton and Monroe report that the distinguishing characteristic of the child with marked reading disability is an unusual facility in mirror reading and mirror writing. Arps reports a case of double inversion, in which the child showed a tendency to both reverse and invert characters in writing. The tendency to reversal of symbols themselves or of the sequence of symbols is the essential feature of what is called word blindness. According to Büttner this defect appears more often than it is recognized. Illing indicates a gradation of the condition from a mild to a severe degree.

Fildes, in a study of mirror writing, states that "Mirror or reversed writing is very commonly found among young children." "It varies in degree." "It occurs both in copying letters and in writing from memory." "There seems to be no doubt that the tendency to reverse letters is only a part of a larger tendency, especially among young children, to recognize forms without apparent heed to the position which they occupy in space." In agreement with Fildes' findings are reports

made by Stern of the young child's indifference to the orientation of pictures in space.

Another study which indicates that the tendency to confuse form and position of symbols is not a sporadic abnormality but a general tendency in young children, is that of Nila B. Smith who investigated the ability of children to select from a number of letter symbols the one which was identical with a sample shown the child. Miss Smith found that her brightest group showed the least confusion, the average group had more difficulty in matching, and the slowest group made some degree of error on every letter in the alphabet.

Gates and Deputy have also used matching tests in their studies of reading disability and of reading readiness.

From observations of these investigators it is evident that the tendency to reverse and confuse symbols is a general tendency at a certain stage of development, later yielding to the habit of reacting to symbols according to position, form, and sequence as distinct elements. If so, an unusual persistence of the reversal tendency may be a major cause of reading disability. If the tendency to reversal can be measured in the young child it may be possible to select those individuals with an unusually strong degree of the tendency and to give them special help in overcoming the difficulty before they have suffered the stigma of failure and before the school has expended upon them several years of instruction by routine methods which prove unsuccessful.

PURPOSE OF THE STUDY

The purpose of the study here reported was, first, to measure the strength of the tendency to reverse and confuse symbols, as it appeared in children beginning the first grade; and, second, to discover the relation, if any, between the strength of the reversal tendency and actual reading progress under the usual routine instruction given in the first grade.

This purpose should not be confused with the problem of instructional methods for children who have the reversal tendency in a strong degree. That is a distinct problem, requiring for its study a selected group, and methods quite different from those of the study presented in this report.

TESTS FOR REVERSAL TENDENCY

Tests were sought which would measure the tendency to reversal in children beginning the first grade. Seven tests for group administration

were tried out in a preliminary study with 52 children. Three of these were eliminated and the remaining four were organized into a battery which was used in the study of first grade children. These group tests and one for individual use are reported in this article. The group tests are: (1) writing or printing from memory, (2) matching script characters, (3) matching printed characters, and (4) copying nonsense characters. The individual test, which is called a Naming Test, will be described later.

GROUP TESTS

Some children on entering school know many letters while others know none. Their performance in writing from memory is conditioned by this experience; nevertheless, the number of reversed letters appearing in their work is significant.

For matching script characters and printed characters, letters and digits which are frequently confused were selected. They were arranged in two parallel columns on the test sheet in such order that in drawing a line connecting two identical characters the child would have to pass some other letter of similar formation. The printed characters selected were the eleven reported by Smith to be erroneously matched by more than ten percent of the 120 children studied by her. To these were added the digits 2, 5, 6, and 9, which are frequently confused.

For the copying test it was desired to eliminate as far as possible the effect of experience or practice. Nonsense characters were devised, therefore, which varied in complexity from a simple loop and curve to complicated forms, none of them symmetrical, but all having definite direction in their spatial position. The number of characters was 26. If a child has a tendency to confuse the position of symbols, such a test, it was believed, would reveal the tendency when the copying of letters more or less familiar might not reveal it.

It is not the function of these tests to measure intelligence. The young child does not know how to proceed in following directions. One child gets the stimulus, another does not. Since the object was to get each child to write, match, or copy all that he could, it was necessary to urge him sometimes by repeating the directions. If he stalled on one character which he could not copy he was urged to try the next line. If he stopped at a similar point in the next line, the evidence was the more significant. During the testing the examiner went about giving additional stimulation and encouragement. If a child declared that he did

not know how to write, the examiner said, "Can you print some letters or numbers?" If the child could print, this would set him off. "Can you make your name? Can you make some numbers?" "That is fine. Now make something else." Such additional suggestions often brought responses which the group instructions did not bring, though some individuals were found in every class who were unable to make any letters or numbers from memory. When copying, some children began tracing the characters, and had to be reminded, "You must make your own picture. Make it just like the one on the paper, but make it down below that one." The battery of four tests requires about 35 minutes to give.

Test 1, Writing or Printing from Memory, serves as an introduction to the battery. Because of the uncertain element of experience which complicates its results, its numerical score cannot be taken as a measure of the tendency to reversal. But it has a twofold value. (1) It introduces the tests by giving the child a task that is familiar and from which he derives satisfaction, which establishes his confidence and makes him more ready for the later tests, in which he is required to perform an unaccustomed task. (2) It gives information on the child's previous experience with letters and numbers, which is valuable in studying the individual record for selection of children to receive special help in reading.

Test 2, Matching Script Characters, was used for its value in preparation for Test 3. Both Tests 2 and 3 are matching tests, in which the child is required to find the characters which are exactly alike and draw a line from one to the other. Because many children entering the first grade do not respond readily to group instructions, some were found who failed to understand what they were to do, but began instead to draw lines straight across from each letter to the one opposite. These children were revealed in Test 2, and could be corrected individually. The test required only a few minutes, and it enabled the examiner to be sure that the children understood exactly what was required of them. In the preliminary study it was discovered that the value of Test 2 lay in this contribution to test procedure rather than in its score.

Test 3, Matching Printed Characters, and Test 4, Copying Nonsense Characters, were of value for differentiating children with varying degrees of the tendency to reversal. Because Test 2 had been used to eliminate the complication of misunderstanding in matching, results of Test 3 were free from this complication, and gave a measure of the ability to discriminate between similar and confusing symbols. Test 4 measured

the ability to copy forms accurately and without reversal. These two tests were scored and the combined score was used to measure the tendency to reversal.

The following method of scoring was used:

Test 3.	Matching Printed Characters.	
	Each correct match	+1
	Each incorrect match	−1
Test 4.	Copying Nonsense Characters.	
	Each form copied accurately	+1
	Each copy, inaccurate but free from reversal	+ .5
	Each attempt with partial reversal	−1
	Each complete reversal	−2

Thus for each test there was a positive score (p) which was the sum of all correct responses, a net score (n) which was what remained after counting in the negative scores, and the sum score (s) which was p + n.

In the following discussion combined scores will be used instead of scores for single tests, and will be indicated by capital letters: S = Sum; N = Net; P = Positive. An additional score, the Quotient score, will be used as a measure of the proportion of correct work in the amount attempted. It is computed by dividing N by P. $\frac{N}{P} = Q$.

In the preliminary study it was found that S gave the highest correlation with teachers' ratings of the children. N and P, however, were not abandoned, and in the final study correlations were computed for them as well as for S.

STUDY OF FIRST-GRADE CHILDREN

The Reversal Tests were given in September to children beginning the first grade. Three public schools in a city of 300,000 were used. School A was located in an industrial district. There were foreign sounding names on the school roster, but the children were native born, and English was spoken in the homes. School B was in a middle class district where the people were workers of the class of the artisan, mechanic, laborer, small tradesman, and others. School C was in residential district inhabited by professional families, executives, commercial and sales people, public officials, and such types.

In the three schools were seven rooms of children beginning the first grade. Repeaters were eliminated, and there remained 262 children, of whom 138 had attended kindergarten and 124 had not. The tests were given during the second and third weeks of school in September.

DISTRIBUTION OF SCORES

Sum Scores.—The distribution of the combined sum scores for the Reversal Tests presents two chief characteristics:

1. Differences between schools. In school A there was a piling up of low scores, yet a few very high scores came from this school. In school B, a middle class district, all but one of the scores fell in the middle ranges. In school C, where there was excellent native ability as well as stimulating social and home environment, the scores tended to be stacked in the upper ranges of the scale.

2. Difference between scores of kindergarten and non-kindergarten children. In every school the highest scores or the vast proportion of high scores were made by children with kindergarten training. Figure I, which shows the combined distributions for all schools, in kindergarten and non-kindergarten groups, illustrates this striking difference. Though both groups had scores ranging from negative to almost the maximum possible score, the mean score for the kindergarten trained group is 37.25, for the non-kindergarten group, 20.23. The maximum possible score was 82. Actually the highest scores in the two groups were 78 and 79.

So widely does the difference between kindergarten and non-kindergarten scores vary from school to school that it is not possible to draw from these three schools any generalizations regarding group standards or norms, or any conclusion other than that there is a marked difference in favor of the group with kindergarten training. The object of the tests, it will be remembered, is not to measure group achievement, but to select individuals having a strong tendency to reversal.

Quotient Scores.—The Quotient is a measure of the strength of the tendency to reversal, whereas the Sum score is principally a measure of the level of performance, *i.e.*, of the amount of work attempted. A child with P = 30, and enough reversals and errors to reduce his N score to 24, would have a Quotient of .80, called simply 80 ($\frac{N}{P} = Q; \frac{24}{30} = .80$). But if a child with P = 30 made no reversals his N = P = 30, and his Q = 100.

Any given Quotient may appear at any level. A child with P = 30, and no errors or reversals, and another with P = 4, and no reversals, both have Q = 100. But the latter child might be in need of special help while the former would undoubtedly learn to read with ease. Thus

FIGURE I

DISTRIBUTION OF SUM SCORES—ALL SCHOOLS

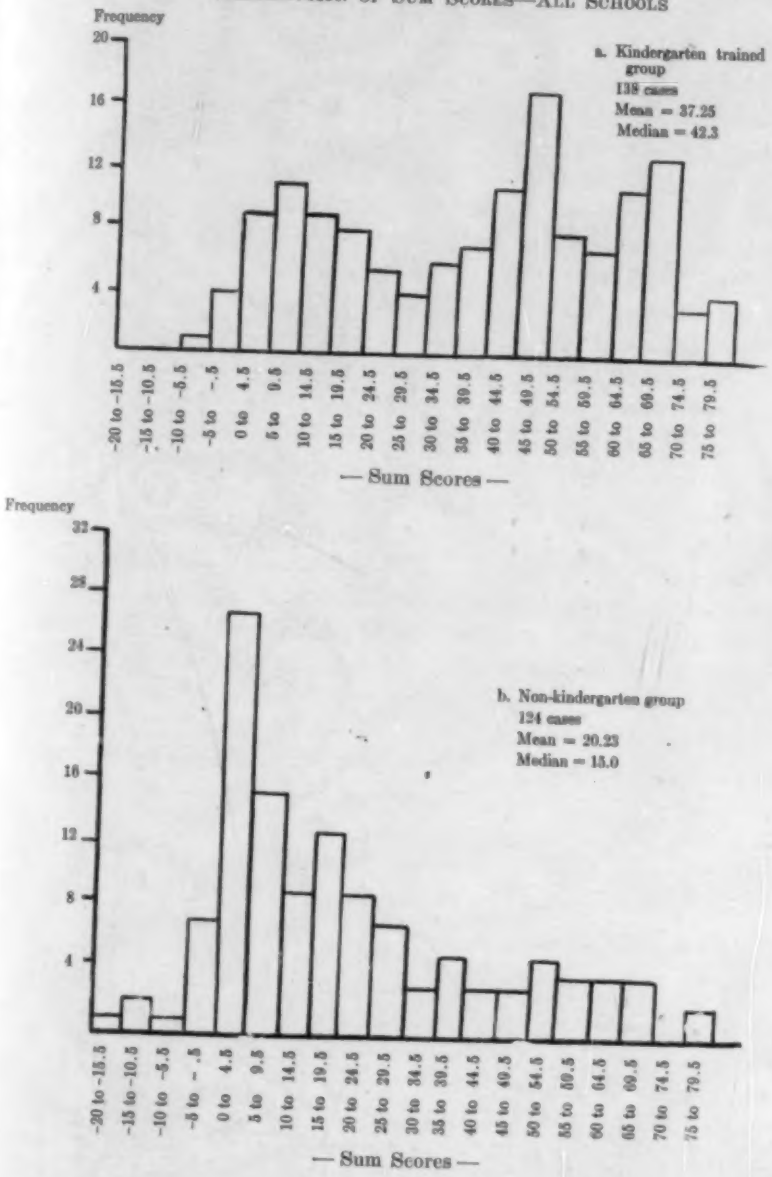
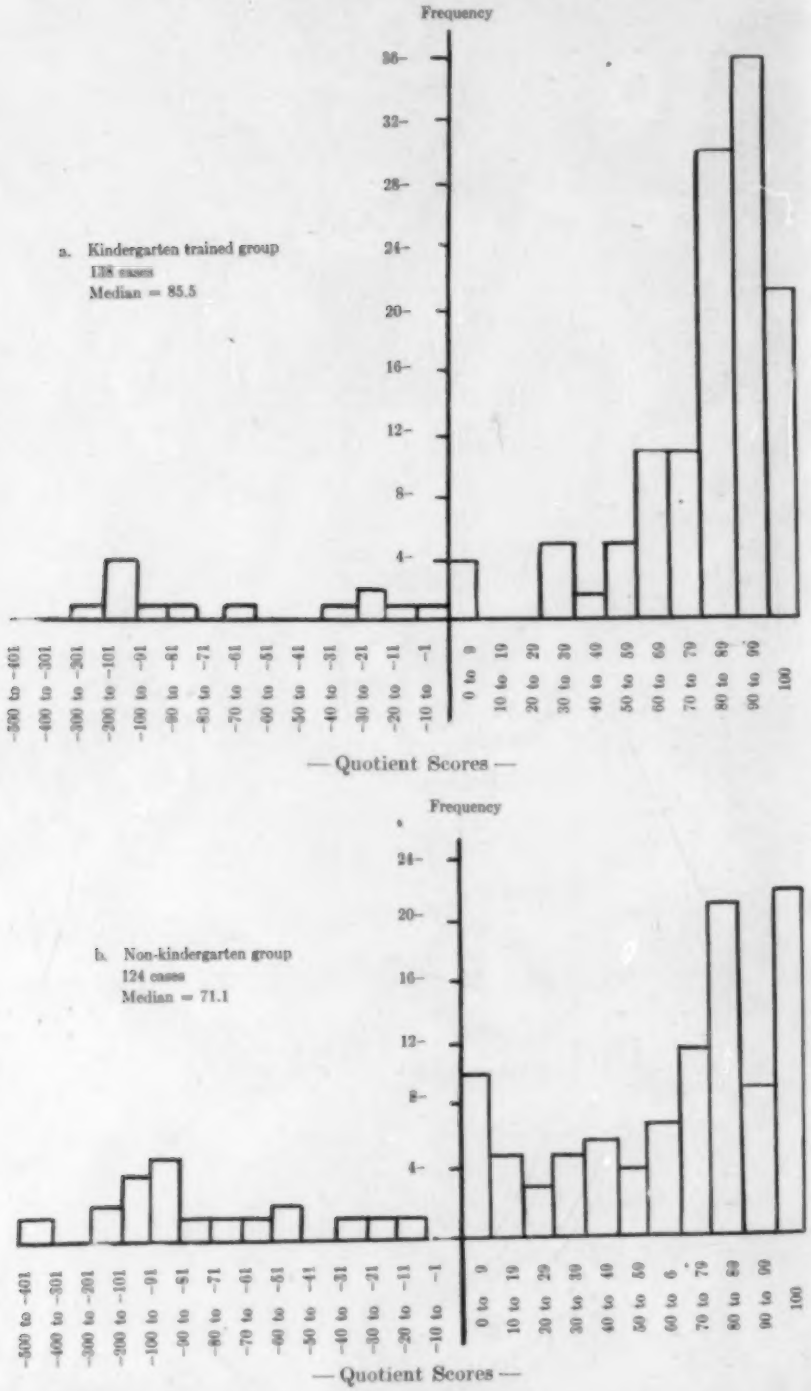


FIGURE II

DISTRIBUTION OF QUOTIENT SCORES—ALL SCHOOLS



the Quotient alone reveals nothing of the level. It is necessary to have in addition one of the other scores, P, N, or S, in order to get a complete picture of the individual's performance.

The distribution of Quotients showed less difference between schools than did the distribution of S scores. The difference between kindergarten and non-kindergarten groups is again conspicuous, more so in schools A and B than in C, where the median Quotient for kindergarten-trained children was only 4.5 points higher than for non-kindergarten children. For all schools, however, there is a difference of 14.4 points in the median Q for the two groups.

Figure II also shows the difference in contour for the two groups. In the kindergarten group the curve hangs lower in the middle ranges and makes a more sudden upward sweep, which is farther toward the right and the high scores than the upward sweep of the non-kindergarten curve. In schools A and B there may have been some difference in the native ability of the two groups, the superior parents tending to make more use of the kindergarten than the more shiftless parents. In school C, where the heritage of both groups was superior, and both groups were equally bright, there was less difference in the median Quotients. Yet even in school C, 37.5 percent of the non-kindergarten children had Q below 70, while but 25 percent of the kindergarten group fell below that point. In the distribution for all schools the percentage of children with Q below 70 was 47.5 percent of non-kindergarten children, and 30.4 percent of those with kindergarten training. As will be seen later, a Quotient between 60 and 70 has a significant relationship to certain performance on the Naming Test.

Summing up the study of test score distributions, it may be stated that (1) the Reversal tests measure the strength of the tendency to reversal in children beginning the first grade, and that (2) children entering school with kindergarten training tend to reach a higher level of test performance, and show less tendency to reversal and confusion of symbols than children without that training.

CORRELATION BETWEEN REVERSAL AND READING

The final study of the group tests of the reversal tendency was made at the end of the school year, when reading achievement was measured with standardized primary reading tests, in order to discover the relation, if any, between the strength of the reversal tendency and actual reading progress under routine instruction in the first grade. The Gates

tests for grades 1 and 2 were used because they test recognition of single words separately from reading of phrases and sentences, and separately from comprehension. The tests were given late in May and early in June. Eighty-three non-kindergarten children, and 107 kindergarten children were found who had been tested in September, and for whom the two sets of scores were available for correlation.

Gates Tests Type 1 and Type 2 gave higher correlations with Reversal scores than Type 3, comprehension. This is not surprising, since Type 1, word recognition, and Type 2, phrase and sentence reading, involve accurate discrimination between similar and confusing words and symbols. There is little choice between Positive, Net, and Sum scores in correlation with Gates Type 1 and Gates Type 2. For kindergarten trained children, correlations with Gates Type 1 were .54 ± .04, and for Type 2 they ranged from .54 to .56 with a P.E. of .04. For non-kindergarten children the correlations with Gates Type 1 varied from .743 ± .033 to .769 ± .030, while with Gates Type 2, they varied from .71 to .75 with P.E. of .03.

Taking into consideration coefficients for both groups, the correlation between the Sum Score and Gates Type 1 is slightly higher than any of the others. It is for kindergarten trained children .541 ± .046; for non-kindergarten children, .769 ± .030.

AN UNEXPECTED DEVELOPMENT

It has been shown that non-kindergarten children had lower scores. Now a much higher correlation is revealed between their Reversal scores in September and actual reading achievement scores at the end of the school year. This difference in correlation raises the question of its explanation, which is a luring question beyond the limits of the present problem. To answer it would require experimental work of a nature different from that of the study here reported.

TABLE I

TEST SCORES OF 15 FAILURES IN 1B GRADE

Child	S	Q	Child	S	Q	Child	S	Q
A28	4	100	B39	— 1	— 75	C32	7	100
A29	— 2	—500	B40	—15	—500	C34	0	0
A30	8	100	B27k	6	0	C63k	17	31
A32	43	68	B38k	— 3	— 62	C66k	— 2	—300
A40	4	— 20				C40k	2	— 20
A21k	0	—100						

Note: The initial letter indicates the school, and the k suffix indicates kindergarten training.

FAILURES IN THE FIRST GRADE

Reversal scores of children who did failing work in the first grade are of interest. Without exception, though the Q may be 100, Sum scores of the children in Table I are low, and in the twelve cases with Q below 100, the work was full of reversals. These were the children who were still in 1B classes in the three schools in which the study was made. Other children had been placed in other schools or had been withdrawn, and the outcome of their year's work is not known. These scores are believed to be typical of children who did unsatisfactory work in the first semester. Of the two among these whose reversal test performance was better than the others, child A32 was handicapped by three months' absence for illness, and C63k was in the lowest eighth of kindergarten children in her school.

Of children in the 1A classes at the end of the year, less than one in eleven had negative Quotients, and of these, almost half were doing failing work in 1A. In Table I, failures in 1B, two thirds have zero or negative Quotients. A negative Q, however, is not prognostic of failure unless accompanied by a low Sum score. For the child with such a combination individual examination is indicated. Results of this first study with the Reversal Tests suggest the advisability of individual examination of children in the following classes:

Q below 40 and S below 20
Q 40 to 89 and S below 15
Q 90 to 100 and S below 10

These classes of scores were found to include 84 percent of all children who when given the Gates tests at the end of the year made an average grade level on the three tests which was less than half through the second semester, *i.e.*, a grade level of less than 1.75. A child whose reading grade level in June was less than half way through 1A work, as determined by his score on the three Gates Reading Tests, was considered as doing failing work in the first grade. Of the children whose Reversal scores fell in the three classes listed above, 77 percent were failures according to this definition. Of the children with Reversal scores not in these three classes, 92 percent made satisfactory reading scores according to the standard adopted. Final determination of limits for individual examination must await further use of the tests and experimentation with effective methods of instruction for the children so selected.

SUMMARY OF GROUP TEST RESULTS

Results of the group tests for the reversal tendency in children beginning the first grade may be summarized as follows:

1. There is a distribution of scores from negative to almost perfect scores. The reversal tendency is revealed in every gradation from total absence to a severe degree, when the tests are given during the first month of school.

2. The strength of the reversal tendency bears a positive relation to reading achievement at the end of the first year in school.

3. Correlation between Reversal Scores and reading achievement is .541 for kindergarten trained children and .769 for non-kindergarten children.

4. There is a wide difference between the performance of children in poor and in prosperous districts, though exceptional and extreme scores are found in each district.

5. Children doing failing work in 1B and 1A include many who made low Sum scores or Quotient scores, or both.

6. Children with kindergarten training tend to make higher Sum scores and higher Quotients than those without such training. This is especially true in schools where the children come from a poor social environment.

AN INDIVIDUAL TEST OF REVERSAL

Results of the Reversal Tests were used to make a selection of children for individual study of the tendency to reversal in reading. Included in the general psychological examination given to these children was a clinical test which gave results closely related to the Quotient score of the group tests.

This is called a Naming Test, though that indicates little of what the test really is. It was devised to reveal direction and organization in the child's reaction in dealing with symbols. Since true symbols could not be used, due to the immaturity of the child, simple outline pictures of familiar objects were used instead. Twenty-five pictures were arranged in five horizontal and vertical rows on a card five by eight inches in size. Some faced right, some left, and some were symmetrical. The child was handed the card and told to "Name everything on that card. Tell me what they all are." As he named them, record was kept of his starting point, and the order in which he named the objects.

Five cards were used, each bearing the same pictures, but with the order and position varied. "Now name those," the examiner said as she gave the child the second card. Again the procedure in naming was recorded, and the process was repeated for the third card. If the child reacted in the same manner in the first three trials that ended the test. If he varied his manner of attack, the fourth and fifth cards were used.

TYPES OF REACTION IN NAMING

The Naming Test was given to fifty children in the course of their individual examinations between late October and middle December. It was also given late in May to all children completing 1A work. Reactions secured at these two distinct stages of reading experience were quite different. Those secured in the autumn were of most significance as a reversal test, and it is they which are reported here. There were six grades of reaction.

1. Absence of system in naming. Scored zero. The child might begin anywhere and jump to any other picture on the card. Four kindergarten and four non-kindergarten children, approximately one sixth, lacked system in the first trial. Of these, two kindergarten and three non-kindergarten children developed system in later trials.

2. Systematic reaction. One point. This might be of different sorts, depending on the type of system employed. Two kindergarten and two non-kindergarten children showed system without additional features for which credit was given. Such a reaction would be one in which the movement was vertically strephosymbolic. *i.e.*, it progressed down one row and up the next, or vice versa.

3. Lateral direction. Credit one point. If in addition to being systematic the reaction showed movement in a lateral direction it was considered more closely related to the reading reaction than if the movement was vertical. One kindergarten and four non-kindergarten children showed lateral direction without sweep, moving across one line and back the next in lateral strephosymbolic fashion.

4. Sweep. Credit one point. This was movement across one line and a sweep back to the beginning of the next, or in naming vertical rows, movement down (or up) one row and a sweep back to the top (or bottom) of the next. Six kindergarten and two non-kindergarten children showed sweep without lateral direction.

5. Left-to-right movement. Credit one point. Lateral movement, even with sweep, was not necessarily movement in the right direction. Usually this reaction did move from left to right, but one little girl had both lateral movement and sweep, but began in the lower right corner.

6. Combination of 3, 4, and 5, beginning at top of card. Credit one point. This was the optimal reaction. Seventeen kindergarten trained children out of twenty-seven and twelve non-kindergarten children out of twenty-three made the maximum score of 5. Of these, three kindergarten and two non-kindergarten children fumbled on the early trials, but later adopted this system and kept it through the remainder of the test.

A total of six kindergarten and three non-kindergarten children improved their reaction during the course of the test. This is approximately one sixth of the fifty children. In no case was there regression to a lower level of reaction.

SIGNIFICANCE OF NAMING TEST

The significance of this test is its close relation to the Quotient score in the group tests of reversal. When the children were ranked in order according to the Quotient, it was found that those with a high Q were those who gave an optimal performance in the Naming Test, that is, they moved systematically from left to right, and swung back to the left for the next line. For both groups the dividing point fell at a Quotient score in the middle sixties.

In the kindergarten group the top 17 cases had Q from 67 to 100, and of these, 16 gave an optimal performance in naming. The child with Q 65 showed system and sweep in naming, but lacked lateral direction. Quotient 61 started without organization in the first trial, adopted lateral movement and sweep in the second, and in the last three trials used the optimal method, making a maximum score. Quotient 55 made a maximum score, but this was one of the last children examined, and had had several weeks longer instruction than many of the children reported here. Of the seven children with Q below 55, some used no organization, some moved up and down, some back and forth, but none gave an optimal performance.

In the non-kindergarten group the top ten cases had Q from 64 to 100. The lowest of these, Q 64, fumbled on the first two trials but found herself on the third, and made a maximum score. The other nine all made a maximum score easily except one boy, Q 78, who started at the bottom and moved back and forth in strephosymbolic fashion. This boy was

left handed, which may have been of some significance in his case. Continuing down the list, Q 63 lacked system; Q 52, one of the last children examined, made a maximum score; and of the eleven cases with Q below 50, nine failed of the maximum score in naming.

The Naming Test presents a situation which is entirely different from those presented in the group tests, and requires a reaction apparently unrelated to the reading response. Yet performance on this test is closely related to performance on the group tests. The Naming Test possesses practicality, intrinsic interest for the child, reliability, and diagnostic significance for the tendency to reversal in reading, if given about the middle of the first semester of school instruction. It may be done in any cloak room where there is a good light, and with no equipment but the set of cards, a chair for the examiner, a pencil, and paper or cards for recording. It requires about three minutes per child, and the children may slip out of the room one after another, row by row or table by table, without disturbing the routine of the school.

APPLICATION OF REVERSAL TESTS

The group tests for reversal can be given at the rate of one room per day, or three rooms per day if the psychologist has sufficient clerical help in scoring and recording. The Naming Test gives a check on the group test results, and affords the examiner the additional advantage of a brief observation of the individual child. This test may be given at the rate of two or three rooms per day. Recording requires no additional time.

The Naming Test can be given by the teacher in odd moments if she can find them, and the results turned over to the psychologist, or it can be used independently of any group test. Results of either the group or individual testing are especially significant for groups which have not kindergarten training. These are the children who are totally unknown quantities when the primary teacher meets them.

From the results of such preliminary testing in the first few weeks of school the teacher or the psychologist is enabled to select the children who reveal the strongest reversal tendency, and to them may be given more thorough examination by the psychologist, and closer attention by the teacher.

Such children, especially if they have not had kindergarten work, should be given some training of a kindergarten character. Drill involving observation, matching, tracing, copying, or manipulation of

forms of various kinds; drills and games in which left and right are emphasized; picture stories in which sequence of pictures and meaning moves from left to right; and any activities in which the child is required to give specific response to specific stimuli will probably be found helpful for children who have a strong tendency to reverse and confuse symbols. Suggestions for training of these children must necessarily be general rather than specific. Detailed techniques in this field of preventive education must await the reports of experimental teaching. The research which is the subject of this report was concerned with identification of children who are in need of special preventive training. Discovery of effective methods for teaching them is a separate and distinct problem.

The amount of special training required in order to prevent failure in the child with an overstrong reversal tendency will depend upon individual intelligence and the persistence of the tendency. The very bright child, even with a strong reversal tendency, is able to overcome it and learns to read under routine instruction without special help. The entire procedure of group and individual testing should enable the teacher, or more efficiently the psychologist and teacher, to select within the first few months of school those children who will be most in need of special help in learning to read.

Prevention of failure in the prospective non-reader will mean saving to the school system in the cost of repeaters. The saving to the child and to society in prevention of the injury to personality which comes with failure are savings which cannot be measured. It is a recognized fact that the child who cannot win satisfaction by doing successfully the things which society demands of him is likely to seek satisfaction in acts which are socially undesirable.

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SOME NEGLECTED SAFEGUARDS IN CONTROL-GROUP EXPERIMENTATION

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CONTROL-GROUP experimentation in education has, during the past decade and a half, increased rapidly in popularity,—perhaps too rapidly. Graduate students are apt to have decided upon the use of this method in their thesis research even before they have decided upon the problem with which to employ it. And during the four years, 1929-32, inclusive, at least one hundred control-group investigations of teaching and learning were reported in the periodical literature. This total, large as it is, can be but a part of the number of such studies which were actually made.

It is not difficult to account for the wide use of the control-group technique. It is, of all methods, the one most readily understood as exemplifying the scientific approach. It *is* the scientific method, par excellence. It is the method encountered in other branches of scientific endeavor. It has reputation. In it the law of the single variable stands out in clear relief, as it does in the case of none of the other research methods of education. Its ready intelligibility, its apparent simplicity, and the conclusiveness of the results to be had through its use recommend it with special force to the research worker.

All the merits of the method may be granted; at the same time it must be recognized that this method is the most difficult to manage of all educational research methods. Its simplicity is confined to its purely theoretical aspects. The real isolation of a single experimental factor and the control of all other factors is, in practice, nothing for an amateur to undertake. The technique is safe in the hands of the expert alone, and in the hands of the expert who knows not only the special tricks of the method, but also the complexity of human behavior in general and of the learning process in particular.

Incautious use of the control-group technique is almost certain to be harmful to the person who is guilty of this mistake in judgment. Such a person, having followed the rules of the game with no evident difficulty and having secured an apparently unequivocal answer to the question he posed for study, is prepared to view *all* educational problems as uncomplicated and open to immediate and final solution through the direct

attack of his favored research method. Insidiously, he comes to believe that any study in which the control-group method is utilized, is, *ipso facto*, a valuable contribution, while other research techniques are of questionable worth and the studies made through their agency may well be disregarded.

But, and more important, the indiscriminate use of the control-group technique impedes real progress in education. In the first place, the invalid findings which it yields get into the literature. There they are perpetuated through the same variety of uncritical thinking on the part of the reader, which, in the case of the experimenter, led to their original statement.

In the second place, the methodology of educational research suffers. There is extreme peril that the control-group may become routinized and standardized. If this happens, and there is evidence that it *is* happening, the peculiar virtues of the technique will be destroyed. Numerous examples of formalized method might be cited. Only one, however, will be mentioned here—a study of problem-solving in arithmetic which appeared some years ago.[1]

The investigator most carefully and conscientiously followed all the customary directions in the set-up of the experiment. Pupils were equated on their scores, not on one, but on two intelligence tests. Moreover, the composites according to which pupils were paired included measures from two standard tests in problem-solving. Problems for the experimental training and testing were adopted only after a meticulous scrutiny of texts and after approval by classroom teachers. All other similar details of a technical sort were handled with an eye to exactness. The experiment proceeded, and the data obtained were given adequate statistical treatment.

But in all this excellence of mechanics one comes upon little evidence that the investigator knew anything about his problem. It is clear that

[1] In order to prevent identification of the study, certain details in the actual investigation have been altered. No good purpose would be served, and much harm might be done, if the study were readily identifiable. This practice of modifying details will be followed in the case of all the other investigations mentioned in this paper as poor applications of the control-group technique. Thus, an experiment actually in arithmetic may be described as having been made in reading; or an experiment really in the high school may be described as having been made in grade VI. It should be clear, however, that the details which are modified are unessential points; the experiments will be here described in *all important* matters exactly as they were made.

he knew little about the theory of problem-solving in arithmetic and about its place and purpose in this subject. It is even clearer that he knew less about the behavior of children when they face arithmetic problems. Nor is there any reason to think that from his labors he learned anything about these important aspects of his investigation. Fortunately, his findings were inconclusive and on this account can affect educational practice not at all. But the point of the illustration lies not in this fact, but rather in the view which this research worker entertained toward his method. His procedure in the investigation did not differ materially from what his wife does when she bakes a cake,—both have certain things to do, and must do them in a certain order; these things-to-be-done and their order are set down in the book. The process yields an excellent cake, but it is not research, and the proof of both statements is in the product. Research techniques cannot be routinized to the point where intelligence and insight cease to serve a useful and necessary function.

The evils and dangers herein described are not intrinsic in control-group experimentation. But the evils are here, and the potential dangers may become actual if the method is not protected from some of its more enthusiastic advocates and practitioners. Certain safeguards, now too frequently neglected, must be more generally observed. The safeguards which I have in mind are not those which pertain to the mechanical features of the method. To say nothing about these features is by no means to belittle their importance. But the types of safeguards I prefer to discuss are different: they represent what is left when these mechanical features are taken care of; they are the heart of the control-group technique. I would like to say that they were the *common sense* of the method if only they were attended to sufficiently often to justify the use of the word "common." Brief consideration can be given to only six such safeguards. The first three of these relate to the treatment of the control-group; the last three deal with the measurement of the experimental factor.

First, then, care must be exercised in organizing the investigation to give the control- or check-group a fair chance so far as the experimental factor is concerned. To a certain extent, in much of the research work done on the problem of the large versus the small class, the small class has been at any experimental disadvantage. When the method of instruction in both the large, or experimental, and the small, or control, group is restricted to the lecture, and when the effects of such instruction are

measured purely in terms of items of knowledge gleaned from the lectures, there remains no particular reason why the larger class should not show as satisfactory results as the smaller class. As a matter of fact, size of class, under these conditions, is only indirectly related to learning. Much more important factors are distance from the speaker, quality of his voice, acoustic properties of the room, and the like. After all, if one is expected merely to know what the speaker says, it is of little consequence whether one is a member of a small or of a large group. If one can *hear* well in a large group, he should learn the facts well in a large group; if he can *hear better* in a large group, it may even be that he will *learn better* in a group of that size.

A certain teacher of chemistry observed, or thought he observed, that students who did not understand the technical terms of the subject had special difficulty with it. Accordingly he organized an experiment to find out. A list of technical terms was prepared; these terms were then carefully taught to the experimental group, but not, of course, to the control-group. In order to discover the value of the special instruction, tests were constructed of items which contained the technical terms. Much to the apparent amazement of the investigator, the experimental group secured higher test scores. This advantage for the experimental group remained even after the most impartial and the most rigorous statistical treatment of the data. Another triumph for educational science!

This last experiment demonstrates well the absurd lengths to which one may go when one fails to give proper consideration to the function of the control-group. The study established nothing whatsoever except that children when taught tend to learn. This hypothesis has, I am confident, for some years been rather generally accepted as valid.

It is fairly common practice for investigators to show little concern for the control-group beyond the amount necessary to guarantee their receiving none of the special training reserved for the experimental group. And yet it must be obvious that something happens *in* and *to* the control-group. It just does not merely do nothing. Activity, learning, development of some kind surely takes place, and it cannot with impunity be assumed that the products of this activity are of no consequence at all,—a thought which brings us to the second and, a little later, to the third safeguard.

Difference in type of training given the experimental and control-groups may not actually constitute an important factor experimentally.

The two groups, carefully kept very *unlike* as to *training*, may really be very much *alike* as to *learning*.

By way of example, reference may be made to several experimental studies which have attempted to test the value of teaching phonetics in the primary grades. The experimental group receives a considerable amount of instruction in phonetic analysis; the control-group, none at all. Rarely is any inquiry made into the behavior of the pupils in the control-group during the weeks of the experiment. Such an inquiry might be enlightening; it might discover, for instance, that some of these children, even without instruction in phonetics, were actually using some form of phonetic analysis in connection with unfamiliar elements encountered in their reading. As a matter of fact, recent studies show that precisely this thing does occur: some children, usually the brighter ones, work out their own phonetic systems and use them with considerable skill. From the experiments I have mentioned, the erroneous conclusion has been sometimes advanced that phonetic analysis is quite without value in primary reading. Failure to secure reliable differences as between the two groups in the experiment is *immediately* responsible for such a conclusion. But indirectly, and more fundamentally, the error is due to the undetected similarity of the two groups, different in training, with regard to their learning procedures.

The third safeguard requires that the investigator note various types of change and improvement which take place in the control-group during the experimental period. I refer to outcomes which may or may not be associated directly with the experimental factor. Although these indirect outcomes in the control-group are frequently unobserved, they may actually be of much greater significance for the guidance of educational practice than some slight advantage found for the experimental group.

The controversy on size of class may be cited again as a case in point. Objection has been raised to the simple mathematical argument that with a small class of 25 students the instructor has two minutes per student in the hour period, as compared with one-third minute per student when his class numbers 150. Nevertheless, I must confess that the argument appeals to me as essentially sound, *provided* that the instructional method is that of question and discussion instead of lecture. With the latter method prescribed, the calculation *is* ridiculous; with the former method, it is *not* ridiculous. When the class is small and when the instructor questions and discusses, types of abilities can be developed, as others

have pointed out, which are not possible of encouragement in the larger classes, for example, such an ability as that of being able to express one's self orally, with clarity, precision, and force, in the language of the given subject-matter. If such abilities as this one are desirable educational products, then it seems to me that there is much to be said for the small class. And to argue from objective-test findings that large groups taught by the lecture are equal for instructional purposes to the small class is to say, in effect if not in fact, that these outcomes are not worth bothering about, and is to be guilty of the error of neglecting the third of the safeguards which should be exercised in connection with the control-group.

We come now to the last three safeguards, which, as a class, have to do with the measurements used for the purpose of experimental evaluation. Much of what has already been said might equally well fall under these heads, except that here the center of interest is the experimental factor as such rather than the control-group.

The fourth safeguard requires that the function and place of standard tests in control-group experimentation be examined much more critically than they have been. Investigators are prone to rely too completely upon the scores secured through the use of these instruments. There are undoubtedly several reasons for this condition, but the most important, I believe, is the fact that too many experimenters still entertain a childlike faith in standard tests. For these experimenters, as for many of their lesser brethren in education, if a test has gone through the mysterious, even magical, ceremony of standardization, it is enough. Now, admittedly, the objectivity of standard tests is in their favor; likewise, their reliability, if it is high enough. But there remains the important question as to whether they possess the peculiar merits demanded by a given investigation.

Time after time one reads of the invalid use of parts of the Stanford Achievement Test, or of the Thorndike-McCall Reading Scales, or of the Woody Mixed Fundamentals Test in Arithmetic, to measure gains in control-group experiments. These tests are of the survey type: they record status in gross units over wide stretches of the subject matter. What is needed in most control-group experiments is instruments which yield refined measures within a limited scope of subject matter. And when such tests are not to be had commercially, the investigator, with what show of grace he can muster, must assume responsibility for constructing and proving his own tests.

A number of years ago a research worker attempted to compare several different methods of teaching children in the intermediate and higher grades to solve problems in arithmetic. For measures he used scores on the Stanford problem-solving test. Of the instructional methods studied the one which was found to be most effective was that which consisted essentially in drill on computation. This conclusion was dictated by the nature of the measures used. Scores on the Stanford test are based upon completely right answers, with no credit allowance for partially correct features of the solution. Such a method of scoring, which may be entirely satisfactory for the real purpose of the test, necessarily placed a premium upon accurate computation; and drill in this ability, given in large amounts to one of the experimental groups, naturally proved to be especially efficacious when their test scores were compared with those of other groups.[2]

The description of this experiment illustrates the danger of trusting too much, for the purpose of experimental evaluation, in scores from standard tests. It also introduces and illustrates another type of safeguard to be observed in control-group experimentation.

Measurement in research of all kinds must be complete; it must be comprehensive. No course of training results in a change in a single aspect of a single ability—or in change in a single ability, for that matter. Learning is complex: the process, even when the attempt is made to restrict it to a narrow field, affects and modifies all behavior in some degree. The consequences of training are not adequately appraised when they are expressed in one or two types of test scores. While absolutely complete measurement of all changes is impossible, the experimenter is not on that account relieved of the necessity of securing evidence regarding as many kinds of change as can be measured.

In the problem-solving study reviewed above, the experimenter himself recognized the strange character of his conclusion—that the way best to teach children to solve arithmetic problems is to teach them to compute accurately. He knew that computation and problem-solving are not the same thing: that the ability to solve problems includes the ability to compute, but that it includes more than that. It comprises the ability

[2] As a matter of fact this investigation raises a question the significance of which transcends any distinction between standard or commercial tests and locally devised tests. That question is the method of scoring. The importance of this question would justify separate treatment in itself, instead of being included, as here, as one of the limitations of a particular standard test.

to read and to interpret problems, to discover the relations between the parts, to translate the language of the problem into its mathematical requirements, to select the correct processes, to arrange these in their proper sequence, and so on. He had measures of only one of these sub-abilities; his measurement was incomplete.

This safeguard need not be elaborated further. It is fully recognized in the theory of research that measurement must be adequate. The problem is to carry this theory into practice in research. We cannot hope, for instance, to learn the relative merits of two systems of teaching primary reading from a comparison of their effects on vocabulary alone. To this and to other similar questions, final answers,—answers which will justify the direction of the educational process in accordance therewith, will be secured only when we have comprehensive measures.

Finally, careful investigation by the control-group method, the same as careful investigation by all other research methods, calls for sagacity and insight in the interpretation of measures. Here again reference is not made to the customary and accepted forms of statistical manipulation, which are generally fairly well handled. Reference is, however, made to a searching analysis of the meaning of measures and a penetrating study of relationships, which are *not* so commonly found in research reports. The routine calculation of medians and coefficients of correlations is not a substitute for what I have in mind, although the substitution is attempted often enough. One has to live with his problem, suffer with it, even pray over it if he is to be capable of utilizing his measures to the limit of their value.

In a comparative study of two methods of teaching history one investigator employed three standard tests to secure his measures. The data from two of the tests revealed statistically reliable differences in gains for the experimental group. The data from the third test showed an equally reliable advantage for the control-group. This striking inconsistency made no impression on this experimenter: he merely reported his data as he found them, without comment. In this study the analysis of measures stopped at the point where real painstaking effort might well have begun, with high hopes of fruitful discoveries. Such painstaking effort is, however, too rarely expended, for the reason that the investigator does not identify himself thoroughly with his problem. He does not go on and on asking the question: Why? Why? Why? If he should be reading the statements made in this paper, he would not

even understand what I am writing about. But until he has come to grips with his problem in this intensely intimate way, whatever else he may be doing he is not engaged in research and his control-group experiment is the most formal of gestures.

I dare say that the six safeguards which I have mentioned as needing to be thrown 'round the control-group technique go back to two fundamental difficulties we face in such research. One of these is that we do not yet know any too well what factors we are to control, nor how we are to control them. Perhaps the greatest research need in education is careful studies of learning—studies which will reveal some of these factors which are to be measured and controlled. For this purpose—to secure light on learning—it is quite possible that other techniques than the control-group method may prove to be most valuable.

The second difficulty is that we must revise our notion of the law of the single variable as it applies to the investigation of educational problems. Much research on learning and teaching in education involves the assumption, as McGeoch[3] has pointed out, that there "is a method of learning which is *really* or *inherently* superior, and that certain experimental conditions permit this superiority to show itself, while other conditions mask or hide this intrinsic superiority. McGeoch[4] has called attention to the fact that such a point of view is contrary to the logic of science. No phenomenon known to science is unconditioned: an absolutely best method of learning has no empirical existence. The scientific goal, and likewise the goal of the educator, is to discover by experimentation all the possible factors of which the efficiency of any given learning method is a function."

The greatest possible contribution that can be expected of educational experimentation is not an answer to the question as to whether Method A is superior to Method B, but an answer to the question as to the conditions under which Method A is superior. New statistical devices are being found which enable us to deal with the number of variables which may be expected to operate and to measure the influence of these variables upon each other. With these developments the control-group technique may more readily reveal the practical values it possesses.

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[3] McGeoch, Grace O. "A Revaluation of the Whole-Part Problem in Learning," *Journal of Educational Research*, XXVI (September, 1932), p. 4.

[4] McGeoch, J. A. "The Acquisition of Skill," *Psychological Bulletin*, XXVIII (1931), p. 418.

The character of the foregoing remarks may now serve to explain my reason for believing that the control-group technique may be too popular. This technique can be too popular only in the sense that its abuse is too common, that the necessary precautions which its use demands are honored only in the breach. The control-group technique, properly conceived and properly employed, with full awareness of its complexities and its peculiar difficulties, is not and cannot be too popular as a method of solving educational problems.

A SURVEY OF FOUR HUNDRED FORTY-NINE SPECIAL CLASS PUPILS

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IN Massachusetts at the present time there are over 10,000 mentally defective and retarded children in special classes. During the past year 449 of these children, in two cities and two larger towns selected to give a fair cross section of the State as a whole, were studied. The survey was authorized by the Massachusetts Legislature to determine the need for social supervision of children under twenty-one years of age who formerly attended special classes.

Four investigators, all experts in the fields of education and psychiatric social service, did the field work under the direction of Dr. C. Stanley Raymond, Superintendent of the Wrentham State School, and the author.

The field workers made a study of 230 mentally retarded boys and girls between the ages of sixteen and twenty-one who had left the special classes of the public schools. Then they made a study of 219 children in special classes. The procedure of the workers was as follows: visits to the home; talks with the individual and members of the family; a study of the records of the school department; reports from members of the school staff; and, in many cases, interviews with employers, police officers, pastors of local churches where pupils attended; and others with whom the children came in contact.

The survey blank was arranged as follows, with ample space for detailed reports:

Town or City.....

1. Name..... Address.....
2. Date of entrance to special class.....
   How long in special class.....years.
3. Chronological age at entrance to special class.....years.
4. Mental age at entrance to special class.....years. I.Q.....

Later examinations
- Date..... M.A.....
- Date..... M.A.....
- Date..... M.A.....
- Date..... M.A.....

5. Present chronological age.....years.
6. Quality of work done in school. Good. Fair. Poor.
7. School behavior.
8. Social adjustment.
9. Social adjustment outside of school.
10. Delinquencies in or out of school.
11. Type of home. Neighborhood.
12. Parents. Social. Financial and moral status.
13. How spare time of child is spent.
14. Industry. What type interests most.
15. Expectancy of industrial and social success.
16. Child's viewpoint of special class.
17. If ever employed, list different jobs; type of work; wages; how long employed; dependability; reason for losing job.
18. Physical handicaps.
19. Would other help or advice have been advantageous in h..... opinion?
20. Estimate of amount of supervision required or needed.

Signature

Date..... .....

Investigator.

The in-school group showed an average I.Q. of 70 with 152 of the 219 pupils ranging from 60 to 79 I.Q. The out-of-school group showed an average I.Q. of 66 with 179 of the 230 within the 65 to 79 I.Q. range. The clinical examination of all children in special classes leads one to believe the group used for the survey is a fair sample of the 10,000 children in such classes.

The average time spent in special classes by the out-of-school group was 3.5 years and of the in-school group 2.8 years up to the present.

DELINQUENCIES

Under delinquencies were classified stealing, sex offences, setting fires, lying, investigation by police, and remaining out late nights in bad company. The out-of-school group showed 18 percent delinquent and the in-school group 21 percent. This percentage is much higher than shown by a survey made in May, 1932, by the State Department of Education. The Department made this survey to discover the general behavior trends of special class pupils. It is a generally accepted opinion

that no person is in closer touch with the special class pupil, knows more of the intimate details of his life, and is better able to supply accurate and intelligent information of him than the special class teacher. The special class teacher has, at the most, eighteen pupils in her room. She has been trained to consider her work with these children as being first of all a careful intelligent study of each individual child under her care. With the small group and with this definite purpose in mind at the start she becomes, undoubtedly, the most trustworthy source of information. In the latter survey, teachers of special classes reported on 9,885 pupils, of whom only 9.2 percent were found to be delinquent in the light of the definition as given above. A survey of the same number of so-called normal children might show a record which was little different.

It was found that 66⅔ percent of the delinquent cases came from families which were rated as dependent or marginal, dependent families being considered as those receiving aid regularly and marginal occasionally.

VOCATIONAL ADJUSTMENT

Of the 230 cases out-of-school, only 3.9 percent were found inadequate in vocational adjustment; 37.3 percent adequate; 23 percent adequate, but opportunity now lacking; 13 percent with satisfactory employment at home; 5.6 percent with no earning capacity; and 9.8 percent with opportunity lacking (uncertain).

The survey in this field brought out some interesting facts. As might be expected, the inadequate group was made up of those children with an I.Q. in the lower range, below 50 I.Q. These children should never have been admitted to a public school. Their vocational and social adjustment as well as their I.Q. indicated that they were institutional cases. Of the 95 employed in industry and commerce, the average length of time on their particular jobs was 1.1 years,—a most surprising fact,—which indicates that the theory that persons of this mentality are irresponsible is not true. With nearly half of this group of the chronological ages of sixteen and seventeen years, this is not a bad record. Many of nineteen and twenty years of age have been employed on the same job three or four years. The salaries earned ranged from $4 to $25 per week, the average in two towns being $12.75, in one city $9.50, and in the other city $4.88. In fairness it should be said that in the latter case, many were employed on part-time work.

The children of sixteen and seventeen years of age, working in small neighborhood stores, earn $4 to $7 per week. The jobs on which these young people are employed indicate types of work we can expect children with a mentality of 60 to 79 I.Q. to perform successfully. Some of these jobs are as follows:

Hotels and Restaurants:—
- Short order cook
- Dishwasher
- Check room
- Cleaning
- Bell hop
- Counter boy
- Cashier

Factory:—
- Shoe:
  - Cementing flaps
  - Machine
  - Punching holes
  - Shipping department
- Raincoats
- Radio
- Mops
- Compacts—powder setting
- Mattress
- Pocket book
- Ice cream
- Printing—job
- Mayonnaise
- B.V.D. power machine
- Garter
- Suit—cutting threads
- Bath robe
- Slipper
- Shirt
- Box
- Curtain
- Shoe
- Bindery
- Rubber—folding aprons
- Roofing
- Box
- Trunk
- Gear and tool
- Leather—finisher
- Car Company
- Bakery—molds bread
- United Fruit Company

Mills:—
- Weaver
- Yarn boy
- Spinner
- Oiler
- Dyer
- Doffer
- Driver of electric car in yard
- Spooler
- Speeder tender
- Winder
- Sewing

Stores:—
- Ice cream
- Fish market
- Grocery
- Fruit
- Battery
- Bakery

Helpers:—
- Ice
- Bakery
- Truck

Boats:—
- Cabin
- Oiler
- Coal

Miscellaneous:—
- Filling bottles in bottle establishment
- Woodchopper

Laundry work	Clerk
Packing (Drug laboratory)	Feed rats in laboratory
Usher	Spraying trees
Garage	Lawns
Charge of parking	Caddying
Steeplejack	Western Union
Presser	Carpentry
Photographic studio	Collecting garbage
Errand boy	Farm work

As the survey did not consider persons of twenty-one years of age and over, we cannot say what measure of success will be experienced by the group as adults. It is safe to say, I believe, that adults of these intelligence quotients will be even more successful in employment both from the standpoint of production and of income. This can have but one meaning: that persons of I.Q.s from 60 to 79 are capable of self-supporting citizenship.

SCHOOL WORK

Of the 219 children in school, an evaluation of school work as reported on the school record cards proved quite unsatisfactory. It was evident that the standard of teachers in evaluating accomplishment varied widely. The words "good," "fair," or "poor" had very many meanings. Some rated the children on the basis of academic accomplishment on the same standard as used in the regular grades; some on the basis of the pupil's ability; and others on the basis of the establishment of mental, physical, and moral habits.

In the out-of-school group, the summary showed 43.9 percent "good," 35.2 percent "fair," and 20.8 percent as "poor" in school work.

Of those now in school, the report is summarized as follows: 21 percent "good," 37.9 percent "fair," and 40.6 percent "poor."

Of those in school, a comparison of academic work with handwork shows the following: Of 49 "good" in academic work, 42 were "good" in handwork; of 96 "fair" in academic work, 43 were "good" and 50 "fair" in handwork; of 89 "poor" in academic work, 16 were "good," 14 "fair," and 59 "poor" in handwork. It will be noted that about one-third of those "poor" in academic work were either "good" or "fair" in handwork. These comparative figures are of some value, for in every case the academic work and handwork were evaluated by the same person. They indicate the value of handwork as a vehicle for teaching these children.

HOW TIME IS SPENT

The groups were judged as spending their time unprofitably if they were in the habit of keeping late hours, street loitering, excessive attendance at movies, wandering with gangs, etc. Of those between 55 and 79 I.Q., it was found that 20 percent of the out-of-school group and 22 percent of the in-school group spent their time unprofitably, with 80 percent and 78 percent, respectively, apparently spending their time profitably. Considering that 76 percent of the families in both groups are reported as understanding and coöperative, 18 percent evasive, indifferent or neglectful, and 11 percent showing drunkenness and mental disease, this record has considerable significance in studying the effect of environment.

SOCIAL ADJUSTMENT

In the in-school group of 219, we found that 112 had made "good" social adjustments in the community, 58 "fair," 43 "poor," and 6 "unknown." In the out-of-school group of 230, it was found that 142 had made "good" social adjustments in the community, 52 "fair," 33 "poor," and 3 "unknown." The social adjustment in school was not as high as in the community, a fact that must become a challenge to teachers. Of those now in school, but 82 percent of those in "good" social adjustment in the community were found to be "good" in social adjustment in the school.

PHYSICAL HANDICAPS

Slight physical handicaps were not recorded. Only those physical handicaps as in the judgment of the investigator influenced the social or vocational adjustment of the individual, were considered. Of the out-of-school group, 83 percent had no such handicap. This study indicates that serious physical handicaps are not nearly as common among this type of children as we have been led to believe. It shows that many of the minor physical defects noticeable in such children are unimportant in considering probable social and vocational success.

THE NEED FOR GUIDANCE

Of the out-of-school group, it was found that 8.3 percent needed institutional care. (As has been previously stated, this group never should have been placed in special classes.) Forty-two and two-tenths percent of the group needed no supervision or guidance. It is interesting to note that, of the 110 who are eighteen, nineteen, or twenty years of age, 57.3 were found to need no further guidance. Of the 110 who are fourteen,

fifteen, sixteen, or seventeen years of age, it was found but 29.9 percent need no guidance.

Many of these young people of the out-of-school group reported that often, in both social and vocational relations, they felt the need of some person to whom they could go for advice and help. Neither the home nor any agency of which they had knowledge was able to meet their need. It is evident by the report of the investigators that, while some need fairly close supervision or guidance, there are many who need only a wise and skilled advisor in the community to whom they can go with perfect freedom when they feel the need of help.

TYPES OF SUPERVISION RECOMMENDED

	In-School Group Percent	Out-of-School Group Percent
Mental hygiene clinic		
Educational and vocational guidance	22.0	21.3
Institutional cases	11.4	8.3
General supervision of all activities	27.8	14.3
Family supervision	16.9	13.9
None	22.8	42.2

As might be expected, it will be noted that the in-school group needs more guidance than the out-of-school group.

CONCLUSIONS

It should be borne in mind that the field workers, all experienced in dealing with mentally retarded children, gave four months to this study. Frequently a worker gave several days to a single case. Lack of space forbids a review of case studies. Only some of the outstanding results are presented herein, but after a careful study of all the material available, the following conclusions are reached:

1. A surprisingly large number of special class pupils are succeeding socially and vocationally.
2. That three-fourths of the homes of such children are effective.
3. That delinquency is not necessarily a characteristic of this group.
4. That physical defects do not handicap social or vocational success in the great majority of cases.
5. That training is more important than academic learning.
6. That, with emphasis on skilled and perfected teaching in the special class, results will be relatively improved.
7. That visiting teachers should be employed. The duties of such teachers in the case of the in-school children will be to make home contacts, advise parents, and render social and pre-vocational guidance. For the out-of-school group, a similar service will be rendered and office hours kept on one or more evenings per week when those who wish may call.

A STUDY IN SOCIAL SCIENCE TEACHING METHODS

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Much has been written about the relative merits of this or that method of teaching social science, but few of the claims rest upon scientific experimentation. The results of this short study are presented without apology in the hope that they may add slightly to the experimental evidence at hand.

Due to the heavy enrollment in the seventh grade of the training school of the Tempe, Arizona, State Teachers College, an opportunity was presented to organize two matched classes in social science for the second semester. Two groups of twenty-seven members each were formed in which each member of one class was paired with a member of the other class on the basis of mental age, educational age, chronological age, and, where possible, sex and race. Mental age, provided the educational and chronological ages were nearly the same, was taken as the chief criterion. As seventeen of the children were of Mexican descent it was thought best not to pair them with American children. The findings of this study are based upon the work of twenty pairs, five of whom are Mexican. Withdrawals and failure to be present for the final examinations resulted in the loss of seven of the original twenty-seven.

In order to assure the same quality of teaching both groups were taught by the writer, student teachers being used only as assistants. The two classes covered the same units of study and used the same texts and references, but were taught by different methods as described below. Care was taken to prevent any competitive spirit arising between the classes, and for this reason no child knew of the study being conducted.

METHODS OF TEACHING

Group A. Contract Group.

The material to be covered during the semester was divided into seven units, and the contracts were carefully prepared in advance. At the beginning of the study each student was given a mimeographed pamphlet containing an outline of half of the semester's work. As soon as he had completed the requirements for which he contracted he was allowed to begin on his contract for the second nine weeks. Each of the seven units of the course was divided into four sections. It was required

that during the semester each student complete the requirements of section one of each unit, and the better students were urged to contract for additional sections. Each child filled out his contract after a personal interview with the writer. No child was encouraged to attempt more than it was felt he could do reasonably well.

The following units constituted the course for the semester:

1. Europe before the Industrial Revolution.
2. The British Empire.
3. The French Empire.
4. Germany.
5. The Agricultūral Countries of Europe.
6. Two Oriental Civilizations.
7. Latin America.

The following outline and contract for Unit IV, Germany, is typical:

UNIT IV. GERMANY.

Outline of Study.

A. What factors made pre-war Germany one of the leading industrial countries of the world? Consider carefully the following:
   1. Characteristics of the people.
   2. Attitude of the government.
   3. Scientific attitude in industry.
   4. Natural resources.
   5. Geographical location.

B. Why did Germany wish to build a World Empire? What were the results?

C. Compare Germany with France and England in regard to characteristics of the people, standards of living, social and political institutions, industries and occupations.

D. What have been the results of the World War in Germany—social, economic, political?

CONTRACTS—UNIT IV.

Section 1.

a. Pass a satisfactory examination of study outline and required readings.
b. Place Germany on your outline map of the world, putting in important rivers, cities, bays, seas, mountains.
c. Know the location and importance of the following: Berlin, Ruhr Valley, Rhine River.

Section 2.

a. Pass requirements of section 1.
b. Make a products map of Germany.
c. Make a graph comparing Germany with the French and British

Empires in regard to size and population.

d. Locate and know the importance of the following: Hamburg, Kiel Canal, East Prussia.

Section 3.

a. Pass the requirements of sections 1 and 2.

b. Notebook work. Make graphs comparing pre-war Germany with post-war Germany in regard to imports, exports, area, population.

c. Make graphs comparing Germany's imports and exports with those of France and England.

Section 4.

a. Pass requirements of sections 1 and 2.

b. Write a 500 word essay on "Industrial Germany" in which you show the importance of the Ruhr, and the dependence of Germany on other nations. Show why the loss of Lorraine and Upper Silesia was felt so keenly.

REQUIRED READINGS

1. Rugg, *Changing Civilizations in the Modern World*, chapters 9, 10, 15, 16.
2. Rugg, *The Great Industrial Nations*, chapter 9.
3. Brigham and McFarlane, *Essentials of Geography*, Second Book, pages 287-291.

Each student worked at his own rate and did as much as he wished to, except that each was required to complete the first section of each unit. Students were encouraged to discuss their problems with each other, with the student teacher, and with the writer. Their work and progress were carefully supervised, and students were allowed to lower or raise their contract at any time that it appeared desirable. There was some class discussion (236 minutes during the semester) but practically all instruction was individual. No attempt was made to keep all or any number of students working on the same unit at one time. Examinations were given whenever the child requested it. They were objective, and did not parallel the comprehensive examinations administered at the beginning and close of the semester.

The following contract was signed by each student in this group:

I,....., contract fo do in a satisfactory manner sections.....of Unit I, sections..... of Unit II, sections.....of Unit III, and sections..... of Unit IV. It is understood that satisfactory means acceptable by the teacher in charge.

Signed .....

Date .....

A similar contract was signed for the last three units.

Group B. Discussion Group.

This group was taught by a more or less conventional method in which class discussion played an important part. The general procedure was as follows:

Assignment of a unit: One or two fifty minute periods.
Supervised study: Three to seven periods.
Discussion, reports, drill, tests: four to eight periods.

Each unit required from one and one-half to three weeks. Special reports, papers, and maps were required from time to time. All progressed at the same rate, but special reports were usually assigned to the more capable students, and covered material similar to that required in sections 3 and 4 of the contracts for Group A. The questions forming the basis of discussion were those in the outline of study for the contract class, but the materials and requirements listed for Group A under *Contracts* were not assigned to the discussion group. The one exception was the place geography requirements which were assigned.

During the semester 960 minutes were devoted to class discussion, and 173 to individual reports.

The text used for both sections was *Changing Civilizations in the Modern World.*[1]

The seventh grade had not been divided into matched groups during the first semester, and none of the students had had previous experience with the contract plan of individual instruction.

At the beginning of the semester both groups were given a comprehensive test covering the whole semester's work. The test was entirely objective and was divided into three parts.

Part I was a test on location containing seventy-four matching exercises. The writer is indebted to Earle U. Rugg's *Curriculum Studies in Social Science and Citizenship*[2] for help in selecting the important places to include in the test.

Parts 2 and 3 covered the first and second half of the semester's work respectively, and were composed of all multiple answer and completion

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[1] Rugg, Harold. *Changing Civilizations in the Modern World.* New York: Ginn and Company.

[2] Rugg, Earle U. *Curriculum Studies in Social Science and Citizenship.* Greeley, Colorado: Colorado State Teachers College.

questions. Part 2 contained twenty-four completion and fifty-eight multiple answer exercises, and Part 3 contained twenty-four completion and fifty-one multiple answer exercises.

The reliability coefficients of the test are as follows: Part 1, .92 ± .015; Part 2, .91 ± .017; Part 3, .76 ± .045; and Parts 1, 2, and 3 combined, .96 ± .013.

The completion and location exercises were questions of fact or place, while the multiple answer exercises emphasized cause and effect relationships. Below are samples of these two types:

COMPLETION

1. Two minerals absolutely essential to a modern industrial nation are .....and .....
2. Just prior to the World War the two greatest industrial nations of Europe were.....and .....
3. England imports most of her raw cotton from.....

MULTIPLE-ANSWER

1. Cities developed towards the close of the middle ages as a result of
   a. Rapid growth of commerce and industry.
   b. People banding together in large numbers for protection.
   c. The industrial revolution.
2. Australia is valuable to the mother country chiefly because
   a. Australia is a great manufacturing country.
   b. Australia produces much wheat and wool which are needed by England.
   c. Australia produces many diamonds.
3. Argentina has become the most modern of the South American countries because
   a. It is a republic.
   b. It is located near the equator and is rich in tropical fruits.
   c. It is a large country located in the temperate zone with rich agricultural lands.

Parts 1, 2, and 3 were administered to both groups on the first three days of the second semester. The tests were repeated during the last week of the semester.

Table I shows a comparison of the groups on the basis of mental and chronological ages. The test of mental ability employed in this investigation was the Terman Group Test of Mental Ability, Form A.

TABLE I

A Comparison of the Two Groups in Mental and Chronological Ages

	Chronological Age				Mental Age			
Measures	Mean	Sigma	Mdn.	Range	Mean	Sigma	Mdn.	Range
Group A	153.15	14.38	157	129-177	153.6	15.41	149	130-185
Group B	149.4	11.84	147.5	133-180	153.6	17.96	147.5	129-187

TABLE II

A Comparison of the Two Groups on the Performance Test at the Beginning of the Semester

	Part 1					Part 2				
Measures	Mean	Sigma	Mdn.	Q_1-Q_3	Range	Mean	Sigma	Mdn.	Q_1-Q_3	Range
Group A	20.4	13.83	18.5	8.5-27	2-50	23.4	12.99	19.5	12-32.5	0-51
Group B	25.95	12.92	26	14.-35.5	6-55	24.95	11.63	25	14.25-34.5	5.5-50

	Part 3					Total Test				
Measures	Mean	Sigma	Mdn.	Q_1-Q_3	Range	Mean	Sigma	Mdn.	Q_1-Q_3	Range
Group A	13.5	8.45	10.5	8-14.5	0-34	55.25	30.96	50	24-73.75	16-119
Group B	11.7	8.72	9.5	4.25-17	0-36	61.5	32.08	59.25	31.75-89	17-141

TABLE III

A Comparison of the Two Groups on the Performance Test at the Close of the Semester

	Part 1					Part 2				
Measures	Mean	Sigma	Mdn.	Q_1-Q_3	Range	Mean	Sigma	Mdn.	Q_1-Q_3	Range
Group A	45.3	15.19	47.5	37-57	13-67	37.85	15.89	36	30-45.5	10.5-67.5
Group B	42.35	17.60	44	31-53.5	12-74	41.1	14.14	44	28.25-54.5	11-68.5

	Part 3					Total Test				
Measures	Mean	Sigma	Mdn.	Q_1-Q_3	Range	Mean	Sigma	Mdn.	Q_1-Q_3	Range
Group A	24.2	9.26	22	16.5-30.5	9-41.5	106.2	34.91	105	84.25-129.75	39.5-176
Group B	27	13.94	25.75	12.75-37.25	3-53.5	110.2	39.46	104.5	65.25-141.75	28-194

TABLE IV

The Average and Median Gains in Point Score for Each Group for the Semester

	Part 1		Part 2		Part 3		Total Test	
Measures	Mean	Mdn.	Mean	Mdn.	Mean	Mdn.	Mean	Mdn.
Group A	24.9	29	14.45	16.5	10.7	11.5	50.95	55
Group B	16.4	18	16.15	19	15.3	16.25	48.7	45.25

TABLE V

The Difference in the Net Gains on the Performance Test

	Part 1		Part 2		Part 3		Total Test*	
Measures	Mean	Mdn.	Mean	Mdn.	Mean	Mdn.	Mean	Mdn.
Group A	8.5	11					2.25	9.75
Group B			1.7	2.5	4.6	4.75		

* The numbers represent the parts of the test.

It will be noted that the average chronological age of the discussion group was a few months lower than that of the contract group, giving them a slight advantage in I.Q.

Due to the small number of cases, measures of reliability of the differences of the means would have little or no significance and are not presented.

Looking at the median scores and interquartile ranges, we find that in test 1, which was entirely place geography, the contract group did superior work to that of the discussion group, but that on tests 2 and 3 the discussion group did better. On test 1 the contract group obtained a median score of 18.5 on the preliminary test with the interquartile range at 8.5 and 27 as compared with the discussion group's median of 26 with the interquartile range at 14 and 35.5. The middle fifty percent made lower scores at the beginning but higher scores at the end of the semester than did the discussion group, the final results being 47.5 for the median, 17 and 67 for the interquartile range of the contract group; and 44 for the median and 3. and 53.5 for the interquartile range of the discussion group. This gives the contract group a net median gain of eleven points over the discussion class.

This would seem to indicate that a contract plan of individual instruction was superior to a discussion plan with class drill for fixing place geography.

A glance at the results of tests 2 and 3, which were largely based upon cause and effect relationships, shows that the discussion plan has an advantage over the individual progress plan, suggesting that class discussion should have a place in social science teaching. It should be kept in mind that during the whole semester the contract group spent very little time in discussion, less than five out of ninety class periods of fifty minutes each.

The results of the total test are in favor of the contract group, giving them a mean gain of 2.25 points and a median gain of 9.75 points over the discussion group.

The writer realizes that the study, at its best, is merely indicative, and that a more careful study based upon a larger number of cases might obtain different results. He is convinced, however, that a plan of individual instruction based upon the enrichment idea, and allowing individual progress, does have certain advantages over a daily or unit assignment type based upon group progress. Certainly the discipline problem

was much less apparent, and the students, on the whole, worked more consistently in the contract group. Constant motivation on the part of the teacher is less needed as the child has a better conception of the task to be performed and recognizes it as his own problem. The nature of the method tends to create a closer relationship between child and teacher, and the teacher, if of the better type, becomes better acquainted with the individual difficulties of the child. It becomes a teacher-child rather than a teacher-class contact. Individual differences are more easily provided for than in a plan necessitating that the whole group be kept at the same rate of progress. The advantages claimed above, however, presuppose a carefully planned and organized curriculum and well trained, intelligent teachers.

The study suggests that a certain amount of group discussion is desirable to the understanding of cause and effect relationships in the junior high school, and should be incorporated into any plan for teaching the social sciences. It also indicates that class drill is not necessary to establish place geography, and that much of our class drill could be well eliminated and made an individual matter.

A STUDY OF THE EFFECTIVENESS OF A PROGRAM OF ELEMENTARY SCHOOL SUPERVISION

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THE problem of this study is to evaluate a program of elementary school supervision. The study was undertaken in a Northern Wisconsin town of about eight hundred population.

It was felt that this problem was important (1) because, while supervisors have been content to take for granted the effectiveness of their supervision, teachers have long since questioned its worthwhileness; (2) because, if the supervisor's position is to withstand the barrage of economic scrutiny, it will have to be justified by productiveness; and (3) because a critical evaluation of the products of supervision should stimulate supervisors to improve supervision.

The writer employed every means and device known to him to solicit and foster in the teachers coöperation and interest in the undertaking. Any program of supervision which does not take the attitude of the teacher into account is doomed to failure. This program was spread over a two-year period. For the first year the writer had the following main objectives in mind:

1. To get a general survey of the whole elementary school situation, which would include
   a. determining the I. Q. for each pupil
   b. determining the educational age and grade level for each pupil
   c. discovering the more obvious weaknesses in the school's program of instruction
2. To awaken in the teachers a consciousness of definite problems and a determination to solve them.

The following activities were employed to interest and assist the teachers:

1. *Classroom visitation:* In order that a fair sample of the teacher's work might be had, a program of visitation was made which permitted the supervisor to observe several classes taught by each teacher.
2. *Individual conferences:* After each visit, conferences were held with the individual teacher. These conferences were friendly give-and-take discussions of teaching.

3. *Professional reading:* In the first bulletin each year it is pointed out that teachers are expected to keep abreast of modern educational practices.
4. *Use of the Torgerson Teacher Rating Scale:* The points listed on this scale were taken as topics for professional study. The scale was administered to each teacher in September and again in May.
5. *Promoting attendance at summer school:* Teachers who needed to attend summer school were urged to attend. A number of the teachers participating in this study did so.
6. *Improvement through travel:* Three of the teachers in this study made extensive travel trips; one to Europe and two through Western United States.
7. *School exhibits and "open house":* Each year our school holds an annual exhibit, and during the second year of this study it maintained an "open house," with special invitations to parents to visit the school, for the observance of National Education Week.
8. *Selection of texts and reference materials:* Teachers were made to feel their responsibility, and therefore, selection of texts and reference materials became a professional task rather than a mere administrative duty. Many new texts and much supplementary material were provided.

The instruments of measurement employed in this program included:

1. The Kuhlman-Anderson Intelligence Tests
2. The Stanford Achievement Tests, Forms A and B
3. The Public School Achievement Tests, Battery A, Forms 1 and 2
4. The Williams Primary Reading Scale
5. The Torgerson Diagnostic Teacher Rating Scale

The data gathered the first year were used primarily for diagnostic purposes; and the improvement program was initiated and measured over the second year period. No measurement was attempted for the growth in desirable attitudes, changes in ways of behaving, and personality development. The results here reported represent only the formal aspects of improvement, and for only such portions as can be made comparable. For the year 1929-30 the Stanford Achievement Examination, Form A, was administered in grades four to eight in September; Form B was administered in May. In the grades below the fourth, the Williams Primary Reading Scale was given. The following year, 1930-31, the Public School Achievement Test, Battery A, Form 1, was given in the

same grades in September, and followed in May by Form 2. While the results of the Stanford Achievement Tests and the Public School Achievement Tests are not directly comparable, the writer made them so by means of the norms for the two tests. In each grade, the norm score for the Public School Achievement Test was approximately four times the norm score for the Stanford Achievement Test for the same grade. Thus, by dividing the Public School Achievement score by four, it is approximately comparable to a corresponding score on the Stanford Achievement Test. In Table I, the initial and final mean scores with the mean growth for each grade is indicated. Table II gives the same information for the Public School Achievement Test results the second year, together with a transmuted (Stanford equivalent score) mean growth score.

TABLE I

SHOWING THE INITIAL AND FINAL MEAN SCORES AND THE MEAN GROWTH SCORE FOR GRADES 4-8, 1929-30, ON THE STANFORD ACHIEVEMENT EXAMINATION, FORM A

Grade	M_i	M_f	M_g
4	29.84	39.45	9.61
5	42.70	53.75	11.05
6	45.58	56.00	10.42
7	65.93	72.43	6.50
8	63.66	69.16	5.50

TABLE II

SHOWING THE INITIAL AND FINAL MEAN SCORES AND THE MEAN GROWTH SCORE, WITH THE TRANSMUTED MEAN GROWTH SCORE FOR GRADES 4-8, 1930-31, ON THE PUBLIC SCHOOL ACHIEVEMENT TEST, BATTERY A, FORMS 1-2

Grade	M_i	M_f	M_g	Stan. Equiv. M_g
4	136.00	180.00	44.00	11.00
5	171.53	206.77	35.27	8.84
6	218.85	261.05	42.20	10.55
7	225.68	252.40	26.72	6.68
8	279.62	308.38	28.76	7.19

Table III indicates the significance of the differences in growth when the mean scores for the first year are compared with the mean scores for the second year.

TABLE III

DIFFERENCE IN MEAN POINT GROWTH BY GRADES FOR THE YEARS 1929-30 AND 1930-31 WITH THE CRITICAL RATIO OF THEIR DIFFERENCE

Grade	Mean Difference in Growth	Critical Ratio
4	1.39 ± .71	1.95
5	— 2.21 ± .75	— 2.94
6	.13 ± .95	.13
7	.18 ± .73	.52
8	1.69 ± .57	2.96

The results of the Torgerson Diagnostic Teacher Rating Scale indicate growth on the part of the teachers. Such a scale properly administered should stimulate the teacher to an intelligent analysis of her teaching. The following table indicates the improvement in teaching practices in the grades compared. The following points of improvement were noted: In the teachers: first, the assignment shifted from a textbook assignment to a problem-solving assignment; second, pupil diagnosis became more scientific; third, remedial instruction became more individualized; fourth, individual differences were more accurately measured; and fifth, pupil interest was increased.

TABLE IV

INDICATING THE GROWTH IN TEACHER RATING FROM SEPTEMBER, 1930, TO MAY, 1931, AS DETERMINED BY THE TORGERSON DIAGNOSTIC TEACHER RATING SCALE

Teacher	Score in September	Score in May
Miss A	68	70
Miss B	69	72
Miss C	69	79
Miss D	69	74
Miss E	71	82

The conclusions to be drawn from these results are none too encouraging; nevertheless, a few positive inferences might be drawn:

1. The time spent in bringing teachers into coöperative working relationship, stimulating them to a consciousness of a professional attack upon teaching problems, and enthusing them with a modern philosophical viewpoint of education which shifts the emphasis from factual subject matter to child interest and activity may not result in a statistically significant difference in the amount of factual material learned. The fruits of such a program should be cumulative and any indication of improvement is indicative of the functioning of such a program.

2. While an average critical ratio of positive .524 is not statistically significant, it can be assumed from these data that teaching can be modernized without jeopardizing factual learning.

3. The fact that the results of a supervisory program such as this do not reveal themselves materially in achievement tests impresses the writer with the necessity for the use of data gathering devices which will measure the more elusive developments in child personality.

4. The teachers coöperating in this program made some definite improvement in their teaching practices. It is interesting to note that the teachers making the greatest improvement were also the persons whose groups made the most significant gains in pupil achievement.

PREDICTING THE SCHOLASTIC SUCCESS OF COLLEGE FRESHMEN

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THIS study was prompted by a desire to investigate the relative value of three available criteria as bases for predicting success in college. The data to be presented were obtained from eighty-five college freshmen. The criteria considered were mental ability, English ability, and high-school marks. Mental ability was determined by administering the Otis Group Intelligence Scale, Form A; English ability was determined from scores on the Cross English Test, Form A; and the high-school marks were obtained from high-school transcripts. In dealing with high-school transcripts it was thought advisable to classify the high-school subjects according to departments, in order that the relative predictability of these departments might be determined. The departments used were English, Mathematics, Language, Laboratory Science, Social Science, and Vocational Subjects. All high-school units were classified in one of these departments.

Since mental ability and English ability were to be correlated with college success, it was decided, first, to find the relationship between these two factors and marks in high school. If these factors predict future achievement, it would seem desirable to know their relationship with past achievement. These correlations are given in Table I.

TABLE I

CORRELATIONS BETWEEN MENTAL ABILITY, ENGLISH ABILITY, AND HIGH SCHOOL MARKS

	High School Subjects					
	Eng.	Math.	Lang.	Lab. Sci.	Soc. Sci.	Vocations
Otis	.24	.43	.29	.37	.26	.30
Cross	.27	.30	.28	.27	.24	.19

It is seen from the table above that the average correlation between high-school subjects and mental ability is .315, and between high-school subjects and English ability is .258. Thus, it is seen that the correlation between high-school subjects and mental ability in this table is somewhat lower than most studies indicate. The results of a few of these studies are: Jordan,[1] .475; Proctor,[2] .378; Ross,[3] .370; and Flemming,[4] .510.

[1] Jordan, A. M. "The Validation of Intelligence Tests," *Journal of Educational Psychology*, XIV (1923), pp. 348-366, 414-428.

[2] Proctor, W. M. *Psychological Tests and Guidance of High School Pupils*, Jour-

The rather low correlations in the present study may be due partly to the fact that these students represent many different high schools with various systems of grading. Few, if any, of these schools made use of objective means of assigning marks.

INTELLIGENCE, ENGLISH, HIGH-SCHOOL AVERAGE, AND COLLEGE AVERAGE

Intelligence correlated .502 with a composite of the first semester college marks; English correlated .443 with the same college composite score, whereas the coefficient for high-school average and college average was .65. It is seen that the first correlation is in keeping with the results of previous studies. For example, MacPhail[5] found an average correlation of .434 between five intelligence tests and college marks; Toops[6] found an average of .441 between six intelligence tests and college marks, whereas Thurstone[7] reported correlations of .54 and .60 respectively between intelligence and college marks in the University of Chicago and Case School of Applied Science.

The high-school marks may now be considered from two points of view: First, what is the relationship between the separate high-school departments and college ability? Second, what is the relationship between high-school average and certain departments in college?

The various high-school departments taken separately correlate with college average as follows: language .66, vocational subjects .62, mathematics .60, English .59, laboratory science .52, and social science .52. Language leads the list and is slightly better than a composite of all high-school marks ($r = .65$). This fact may be due to the nature of language ability since it seems more closely related to general ability than are abilities in some of the other subjects.

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nal of Educational Research Monographs, No. 1 (Bloomington, Illinois: Public School Publishing Company, 1923), pp. 11, 15, 16.

[4] Ross, C. C. *The Relation between Grade School Record and High School Achievement*, Contributions to Education, No. 166, New York: Bureau of Publications, Teachers College, Columbia University, 1925.

[5] Flemming, C. W. *A Detailed Analysis of Achievement in the High School*, Contributions to Education, No. 196, New York: Bureau of Publications, Teachers College, Columbia University, 1926.

[5] MacPhail, A. H. *Intelligence of College Students.* (Baltimore: Warwick and York, 1924), p. 29.

[6] Toops, H. A. "The Status of University Intelligence Tests, 1923-24," *Journal of Educational Psychology*, XVII (1926), pp. 23-36, 110-124.

[7] Thurstone, L. L. "Psychological Tests for College Freshmen," *Educational Record*, VI (1925), pp. 69-83, 282-294.

Let us now turn to the second question which is answered by the following correlations: High-school average and English .59, Bible .61, laboratory science .63, mathematics .48, language .53. Thus, it seems that high-school average best predicts college marks in science, and least adequately predicts mathematical ability. In the absence of kindred data it is not possible to make any comparisons with respect to these results.

TABLE II

SUMMARIZED ANALYSIS OF CRITERIA FOR PREDICTABILITY OF COLLEGE MARKS

Criteria	r	k	% better than guess
H. S. Marks	.650	.760	24
Intelligence	.502	.865	13
Eng. Ability	.443	.890	10

Table II shows that high-school marks are 11 percent better than intelligence for predicting college success, and 14 percent better than English ability for the same purpose.

If these three criteria taken separately predict college marks as shown above, what then is the predictability of all three combined? In order to answer this question it was necessary to combine the criteria by means of the multiple correlation technique. This technique gave $R_{o(123)}$* = .81.

* 0 = College marks
1 = High-school marks
2 = Intelligence
3 = English ability

It was also shown by the same method what the various criteria yield when taken two at a time. The results were as follows: $R_{o(12)} = .71$, $R_{o(13)} = .70$, and $R_{o(23)} = .54$. From these results it seems safe to conclude that all three criteria $R_{o(123)} = .81$ are better by ten points than any combination of just two criteria. It is evident, however, that high-school marks lend most to prognosis in this study since $R_{o(23)} = .54$, which is eleven points lower than the zero order correlation between college marks and high-school marks; this was to be expected and is, of course, a strong suggestion that high-school marks is yet our best single measure of future college records.

In case predicted college scores are desired, a regression equation is necessary. Such an equation was calculated, and written in score form it is: $\overline{X}_o = .489X_1 + .236X_2 + .047X_3 + .82$. By applying the standard error of estimate to this equation it was found that on the average a college mark may be predicted with an error of only $\pm$ 5.50, *i.e.*, σ (est. x_o) = σ_o .123 = $\pm$ 5.50, and the P. E. (est. x_o) = $\pm$ 3.71. The chances are 50-50 then that an obtained college score of 80 may be pre-

dicted to fall within the range from 76 to 84. It is practically certain that any estimated college mark will not be in error more than 15 points. It is recognized, of course, that no measure is as accurate as the student's actual record; however, if psychology and education are to live up to their ultimate aims of prediction and control of human behavior, it seems that some such basis as has been presented would render rather definite service in a program of advice and guidance for high-school graduates as regards further academic efforts. For example, the two cases of total failure in this study might have been advised definitely away from such experience had the three criteria been adhered to. A blind adherence to statistical facts is not recommended because such factors as interest, motivation, and industry are important; however, it would be unsound psychology and poor economy to count on or even hope for phenomenal changes in human nature upon entrance to college.

The foregoing results seem to encourage the following conclusions and recommendations:

I. Other things considered equal, it was possible to predict college marks to the extent of $R_{o(123)} = .81$ when high-school records, intelligence, and English ability were used as criteria.

II. When the criteria were considered separately, high-school marks was .15 correlation points better than intelligence test scores and .21 points better than English test results in college prognosis. The regression equation shows that high-school records should be weighted twice as much as intelligence test records and ten times as much as English test results.

III. During the course of a more detailed examination of the data, it was observed that certain tendencies even on the part of college instructors undoubtedly invalidate work of this kind; *e.g.*, in the first place, little attempt at objectivity in administering and scoring examinations was evidenced, and in the second place, 70 percent of this freshman group made grades of A's and B's in one of the major departments of the college. Such lack of discrimination in scoring usually upsets the reliability of data, hence the tentative suggestion that high-schools and colleges adopt some uniform and objective bases for scoring, and thus eventually give up the notion adhered to by many that the subject matter must be adjusted so that "B" is an average grade.

A PERSONNEL STUDY OF NEGRO COLLEGE STUDENTS*

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STATEMENT AND PURPOSE OF PROBLEM

THE purpose of this study is to ascertain the relation between certain background factors of Negro college students and their subsequent careers in college; and to reveal what importance and utility should be attached to a knowlege of these factors in advising them concerning their entrance into college; and their proper orientation and guidance.

THE DATA, THEIR SOURCES, AND TREATMENT

The data consist of facts concerning the social, economic, and intellectual background; scholastic achievement and interest; and extra-curricular activities of 450 students who entered Fisk University during the years 1926-27-28. The facts were secured from the following sources: (1) Freshman questionnaire, (2) student's application blank, (3) high school transcript, (4) college transcript of advanced standing students, (5) registrar's permanent record card of each student, (6) test scores made on the Otis Self-Administering Test of Mental Ability, (7) test scores made on the American Council's Psychological Examination, (8) scores made on diagnostic tests in English and mathematics, and (9) special questionnaire filled out by students who were in residence at Fisk during the winter quarter of 1930, concerning various extra-curricular activities and study habits.

The status of each student was ascertained with respect to his previous social, economic, and scholastic background and his subsequent achievement and interests in college; also the inter-relations between these factors were discovered, by comparing the means, quartiles, etc., of the groups. In addition case studies were made of a limited number of deviates.

FINDINGS

1. While the majority of the students come from the South, those coming from the North increased one hundred percent from 1926 to 1928.

* Caliver, Ambrose. *A Personnel Study of Negro College Students.* Contributions to Education, No. 484 (New York: Teachers College, Columbia University, 1931), 146 pp.

Three-fourths of the students—which percent is increasing rapidly—come from large cities and from public high schools.

2. A majority of the students have a fairly substantial economic background as measured by home ownership, size of home, and modern conveniences. The average number of children per family is 3.40. More than fifty percent of all the children in the families represented have had or are having college experience. Fifty percent of the brothers and sisters of the students represented, who are working, are engaged in professional occupations. Excluding the professional group, the mothers lead the fathers in formal education. Nearly one-third of the students have one or both parents deceased.

3. Students' interests, outside the regular classwork, in both high school and college, are limited and narrow, the greatest emphasis being placed on athletic activities. A large number of students had traveled widely before entering college, but only a small percent changed high schools in the course of their careers.

The time spent in study in college by the students, as a whole, varies in inverse ratio to their intelligence; this is also true with respect to the points of extra-curricular activities carried by the students. The athletes show a slight superiority in intelligence over the non-athletes, but are inferior in their school and college work. Students who entered with advanced standing do not show any superiority over the regularly entering freshman. A larger percent of girls is sent to college than men, and they are much younger and also slightly superior in intelligence and school and college achievement. There is a strong tendency for the vocational interest expressed by students upon entering college to be reflected in their choice of a major.

4. There is a significant difference between the intelligence of the entering class of 1926 and that of 1928. The children of the professional, business, clerical, and skilled groups generally maintain a higher rating throughout the entire investigation than those of the farming, domestic, and unskilled groups. While there is considerable shifting between the various groups within these two levels, the children of the clerical group lead all others in practically every test administered.

5. Students from Northern communities outrank those from the South in scores made on the intelligence tests, but the Southern group leads in college achievement. Public school entrants surpass students from private schools in scores made on the intelligence tests and in college achievement. The intelligence of the students is in inverse ratio to the number

of children per family; and the amount of schooling possessed by the parents seems to have little influence on the intelligence rating of the children; it does, however, show a close relation to the length of time the students remain in school. The reading interests of the more intelligent students are more varied and of a higher quality than those of the less intelligent.

6. Nearly one-third of the students had dropped out by the beginning of the tenth quarter after the investigation started. Of the number who left, fifty-six percent withdrew by the end of their third quarter of residence. The farming and professional groups respectively lost the greatest and smallest percent of their numbers. The greatest number left on account of scholarship deficiency. Financial difficulties and change of school were the factors next in order as causes of withdrawal.

CONCLUSIONS

1. The influence of certain background factors seems to be definitely reflected in the trend of college enrollment at Fisk University, and in the equipment which the students bring to college. Some of these factors are: Migration, improved educational facilities in the South, urbanization movement, improved economic status of the Negro, traditional reverence for professional careers, and limitation of recreational and cultural opportunities for the Negro in Southern communities.

2. Certain background factors seem to have a definite influence on the subsequent achievement of college students, particularly when a combination of the factors is considered. Some of these factors are: Paternal occupation, high school preparation, certain social background factors, and intelligence.

3. Some of the background factors seem to have little or no relation to certain subsequent school and college activities and achievement of students. The factors which show this lack of correlation are: The amount of schooling obtained by the parents and the rating of the students on the psychological examination, the size of the family and the extent of college attendance of the children, the number of brothers and sisters of college experience, and the persistence of students in college.

GENERAL RECOMMENDATIONS

1. That a coöperative study be undertaken by a large number of Negro colleges, to extend over a period of years, along lines similar to the present study.

2. That as rapidly as possible, Negro colleges introduce a more comprehensive system of student personnel records. This should be done on the basis of a coöperative study so as to make the accumulated data comparable.

3. That the program of research begun by many Negro colleges and individuals be continued, encouraged, and supported by the administrative officers of the various colleges.

4. That a constant effort be made to learn more about our students and to relate that knowledge to the education we try to help them acquire.

EDITORIALS

EDUCATIONAL AIMS IN RELATION TO MENTAL ENERGIES A FIELD FOR EDUCATIONAL RESEARCH

To observe the working of a complex activity such as school instruction, even of a simple exercise, means to consider the relation of the particular accomplishment noted, and of the observed method, to the energies used and to the final results sought from the activity as a whole. When discussing in the last Journal, the contrasts between two kinds of action by mental energy the Observer noted that the real teacher tries to combine the direct action of mental energies, due to talents for an individual direction of expressions for ideas or appreciations, with the energies of interacting social character which, through standards of conduct and common ideals and appreciations, control the direction of fellowship relations in life.

The teacher's efforts to maintain certain definite ideals of responsibility in the pupils for conditions of health and relations of loyalty, honesty, cheerfulness, coöperation, courage, industry and the like, indicate an educational aim quite distinct in its methods and broader in its concepts of the uses of knowledge and skills as guides to personal relationships in conduct, from the aim of intellectual mastery. The understanding of knowledge and of skill in relation to the needs of fellowship activities gives a social meaning to school studies which should add incentives for self-directed coöperation in class work not given so directly by intellectual recognition of satisfactions in complete mastery of a subject as an organized body of knowledge. The difference is that which distinguishes between isolated individual development and a power coördinated with others for social and civic advancement.

Realizing this actual situation in the work of the schools, educational research has before it a very definite opportunity to analyze the relationship between educational aims and the uses of mental energies and to determine the facts with regard to the activities by which the differing elements of educational development may be secured.

Observation of mental energies at work under free and natural conditions has many difficulties, especially when it is required to check every

inference or deduction that may seem to interpret the results. Two observations are given in outline to illustrate the situation.

Some five or six years ago, a morning was spent with Doctor Bird T. Baldwin and one of his preschool classes,—the classes used for observation of child activities in connection with many investigations of various experiences from strictly physical coördinations to isolated intellectual developments. The day was perfect for outdoor play, and four tiny tots of about two and a half to three years old were busy about three swings. The seats in these swings were arranged so that each was at a little different height from the ground. Only one was too high for a child to get into the swing from the ground. This swing had a back and side arms to make it safe. There was a slat across the middle of the back which could be grasped by the hand.

The children paid no attention to us as we talked together not far away. With perfect freedom to follow any inner urge to do something, we soon noticed that the two youngest were in the lower swings and the other two were examining the high one. A small box stood against the nearby tree and was soon noticed and brought to the swing and used as a step by which one child got into the swing. The fourth child was an active little fellow who played back and forth with those in the swings. Soon we noticed him persuade the child in the high swing to get down. He then moved the box to the back of that swing and, with very evident purpose, started to climb up the back of the swing. Every motion took him directly on his way to the top and, without a check, he climbed directly over it and down into the seat. There was no appearance of a feeling of triumph over what the others had done, but his companion watched him with admiring breathlessness.

A student checking the physical coördinations would have made a lot of notes on the exactness with which eye and hand and foot worked together to make each step lead to the next without apparent hesitation for mental guidance. And yet the Observer noted evidence in the entire situation that a clear mental picture of the way to go over the top had been formed in advance of the first actual step up, and had keyed the nerve controls for coördinated action throughout the process. The preliminary play activity with the other children called out efforts for social contributions. When each of the others had accomplished something and they were in the swings, this active little fellow saw a new possibility, pictured the way to make his contribution and carried it through with no selfish thought of doing something daring and exceptional. There was

no evidence of self-centered ambition to excel. He only contributed an experience which his activity made easily possible. Had any of us rushed up and made much of him we might have turned his mind toward self sufficiency; but that is not done in that preschool classwork.

The above describes the free action of mental energy in a situation involving a social situation closely connected with a response by muscular action coördinated for a definite direction of the needed motor controls. The distinction from merely muscular play action will be clear if compared with the difficulties of a young kitten when it first uses its claws to climb up the trunk of a tree and finds claws do not work when it heads down the tree.

Mental energy working in the highly complex situations of a high school class in geometry is not so easily distinguished from teacher directed forces of related ideas as the pupils organize the subject matter facts into a body of knowledge. The ability to so blend ideas as to express knowledge may be considered as similar to an ability to blend colors to give an artistic expression of an experience of the color harmonies of a scene. Each requires the power of talent to use the forces in ideas. In the discussion of last month this action was described as comparable to the inertial force of matter discovered by Galileo. This comparison is helpful only for the purpose of distinguishing a difference between the working of talent and the working of another distinct power of mental energy which was described as "character," and defined as the mental energy of interaction between minds, working as members in a common fellowship.

The observation of the particular school situation now to be given is concerned with the teacher's effort to bring both phases of mental energy into the consciousness of the class as a means of giving a larger meaning to the work of learning, and particularly to the mastery of geometry as integrated with the character activities of mental energy. The background for such a description is an acquaintance with the guiding personality of the teacher. A morning spent with him as he handled his duties as principal of the high school, all of the activities of which carried out his efforts to provide a real educational opportunity for all concerned, a visit to one or two classrooms in which teachers and students showed how responsive all were to the aims and methods being worked out, was followed by lunch at the principal's home. Here it was a delight to enter into the personal associations of this fatherly Pestalozzi, to use the name

of one in early educational development whose character was brought to mind by many of the incidents of this day. One of the students of the school was staying with the principal's family for a time while his parents were on a journey. These parents evidently considered it a needed opportunity for their boy to come into this home relation for a few weeks. It proved, also, to be an opportunity for me to follow the skill of this principal in gaining the boy's confidence and discovering words by which to arouse new aims and stir into action new energies to control his relations to home and society as well as to secure a more determined purpose to succeed in school work. This noon hour relation continued as the three of us walked back to the school, and the boy left us for his class with a glowing face.

The geometry lesson which followed would require reels of motion picture films to show what went on, and the pen of an Abraham Lincoln to connect the pictured groups at work, with the processes of mental activity using energies working as talent for clear thinking and also as character acting in judgments determined by proved facts, in appreciations recognized as the experiences of a real fellowship, and in purposes to be carried out in coöperative unions for true and harmonious ends.

The work of the class illustrated what was in the mind of Lincoln's school master when, in answer to the young lawyer's question, "How can I know when I have proven my case?" he told Lincoln to study Euclid's geometry. The class formed itself into groups each with a chosen leader. Some groups were working in advance and others behind the common attainment but no individual or group accepted anything less than a full understanding of the steps taken up to the demonstration being studied. The line of reasoning from the first theorem was a continuous development of geometric thinking used to make the further advance required in the day's lesson of the individual or group. Here was intellectual talent moving to new power in its own field of action.

But this was education only if this power (not the particular straight line of geometric demonstration) is so related to other situations that, as Lincoln's school master suggested to him, it enables the mind to know when it has proven its case. It was such a "transfer of training" as the psychologists call it, which this genius teacher undertook to accomplish. His sympathetic experience as a teacher guided him to the effort to do more than just to make a few applications at cross-road junctions with other straight lines of talent development. The *ideal* of making

use of straight line thinking *wherever needed* was to be established. Such an ideal, as Bagley has shown, is an energy working continuously to maintain a common standard for all work. The group organization by which those of like talent abilities worked together with a leader, gave a relationship stimulating to the class as a society of groups interested in the work of all. This effect was insured by the teacher as he at times brought the attention of all to some particular situation for which any one offered helpful illustrations or other suggestions.

It is not easy always to recognize a principle for general action in a particular experience of its truth where it is so plain as to be taken as immediate knowledge needing no principle to explain it. To use a geometrical situation, an actual triangular frame not only appears as a rigid figure but also all of our experience has found it so. But a well made four-sided frame seems rigid and only experience with such frames not well connected shows their weakness as due to a principle of construction. The principle might be used as one definition of a triangle. It does define the congruent triangle. As a principle, however, it demonstrates one way of measuring a distance which is inaccessible between two points, and helps to demonstrate other geometric relations.

The method of geometry may yield an ideal of certainty wherever definite principles are accepted as the basis of thought or of conduct. A few principles of social conduct may assure the development not only of true personal integrity of character but also of harmonious organization of all social, civic, and economic relations. Something of this was secured by the genius teacher but is here very inadequately described.

G. A. B. REPORTED BY AN OBSERVER.

EDUCATIONAL RESEARCH AND THE TIMES

During the past year the schools have felt keenly the results of the current economic-social disturbance and face the same situation for the present school year, in spite of definite improvement in industry, banking, and business. It is to be expected, with the present scheme of things, that just as the curtailing of school budgets lagged behind the business depression, to the same extent will the return of school prosperity be delayed after an economic revival.

This state of affairs has meant a reduction of appropriations for research agencies in universities and public school systems, as well as a decrease in the number of graduate students, presumably registered for

training as potential research workers. In fact, almost inevitably, when universities publish statements concerning their reduced budgets, they refer to research as one of the major areas where "savings" have been effected. Is it real economy at any time, particularly in periods of stress when problems are most numerous, to lessen the intensity of the search for truth? Does the profession of medicine, during periods of calamity, flood, famine, pestilence, fire, or war, lessen its efforts; or consider the existing situation as a challenging problem to be solved? For example, plastic surgery made great strides forward during the late war. Incidentally, the field of mental testing, especially group tests, made remarkable progress during the same period, when confronted with the tremendous task of measuring the capacities of millions of soldiers. Of course, the answer to the question raised above is that during a storm the crew of a vessel does not throw overboard skipper, charts, compass, and nautical instruments. On more than one occasion nations, for example, Prussia in her earlier history and certain countries since 1918, have turned to education as a means of recouping grievous economic, social, civic, and physical losses. Education in turn must depend on its fact-finding agencies for guidance.

It is not easy to say what type of research is most needed at present. Business and industry of late probably have examined more carefully their charts and cycles of the past than at any other time in history. School people, when so much is said and written about "fads and frills" and a return to the "fundamentals" of the "good old days," must know educational history in order to evaluate accurately the new and the old. The problems of class size, individualized instruction, and progressive education require the contribution of the educational historian for adequate analysis. When legislatures are passing drastic school laws, which inevitably must be changed when the members are saner, wiser, and less panicky, more than ever before the efforts of the relatively small group of research workers in the field of school legislation should be extended. Suggestions or commands for changes in curriculum, organization, or method, dictated by the voice of legislative or executive authority, born of necessity or panic, must be tested experimentally in actual school situations for any worthwhile evaluation. There is more urgent need for surveying current school conditions in a time of economic depression than during a period of prosperity. In fact, the past few years have been remarkable in terms of the great national surveys conducted (mod-

ern foreign languages, land-grant colleges, secondary education, teacher education, school finance, social studies, and the White House Conference on Child Welfare), although it is true that appropriations were made for some of these studies prior to 1929. Tests are needed which will measure the products of the "new education," which are said to involve values other than factual information. It is desirable to know what effect present economic, social, and home conditions have on the accomplishment of the child, as well as on his attitudes, personality, character, and emotional life. This type of investigation involves detailed case study of the children represented, as well as adequate measuring instruments.

The point of view expressed above will not be accepted universally among school workers. It is even suggested in otherwise respectable educational publications that, in view of the great amount of research completed and the lag of field workers in utilizing the results of scientific studies, a moratorium be declared with respect to further investigations; and that, because of the present oversupply of teachers, teacher-training institutions be closed for a two-year period. Scientific and research societies have felt the pinch of the times; valuable periodicals have reduced their size and, in some instances, suspended publication.

It seems unnecessary to call further attention to the host of problems awaiting solution, to point out the important function of teacher-training institutions for the in-service training of school workers, or to urge support of scientific organizations, agencies, and publications which stimulate, conduct, report, or train for educational research. In this instance it is not a case of preparing for war in time of peace, but of accepting the challenge of a lean period to maintain progress already accomplished, and in the face of difficulties to move toward the attainment of continually advancing goals.

CARTER V. GOOD.

REVIEWS

Address all communications relative to book reviews to Editor Kai Jensen, University of Wisconsin, Madison, Wisconsin.

BOYNTON, PAUL L. *Intelligence: Its Manifestations and Measurement.* (New York: D. Appleton and Company, 1933), pp. xi + 466.

This refreshing, critical and scholarly account of "intelligence," though written for the student, raises so many issues that it should invite the serious consideration of the professional. Though it covers the familiar topics of the subnormal, the supernormal, types of tests, rules for administration, elementary statistics necessary for interpretation, application of tests to problems in education, delinquency, sensory deficiencies, sex and race differences, the work is no pedantic summary, but a vigorous well-annotated critique of the best researches relating to these subjects. Boynton has spent considerable time in the field and clinic as well as in the library, and is frankly skeptical regarding many current practices and concepts.

The weakest part of the book is the author's treatment of the nature of intelligence. He distinguishes it from formal knowledge (intellect) which he believes is measured by most current tests (especially group). Intelligence is not acquired but "is an inherited factor" determined at conception—a something which "only the neurologist is really in position to measure, or, for that matter, even define . . . in exact terms." Not only does this view rob psychologists of a cherished concept, but it passes the buck to the geneticist who would certainly conceive of such a complex variable not to be due to *an* inherited factor but rather to many. If Boynton insists on having "intelligence," the burden of proof rests upon him and not upon geneticists or anatomists.

Actually when the author gets down to cases, he adopts a multiple-descriptive view of intelligence. Thus "in a careful diagnosis of feeble-mindedness, it would behoove one to take not one criterion but practically all of the criteria," of which there are four, namely, unsatisfactory scholastic progress, mental age under 7½ or 8 years (for adults), I. Q. under 50 to 55 (Terman), and inability to care for self without the aid of society. Not only does the author consider the societal-adjustment criterion the *most* important, but it is to be noted that his upper limits of feeble-mindedness based on test measures are considerably lower than are observed in current practice. His revaluation of norms, for which he presents an able, documented defense, has many interesting consequences, one of which is his estimation of feeble-mindedness both in the general population and among delinquents to be hardly greater than 5 percent.

Considerable evidence is massed to show the supernormal child to be average if not superior in physique, social background and orientation, but to be "retarded" educationally. By retardation is meant the fact that the mean E. Q.'s of

superior children are below their I. Q.'s, a fact which when coupled with the reverse relation for subnormal children, is interpreted as indicating that educationally the latter children are "pushed," the former, ignored. This interpretation, though quite universally accepted, does not necessarily follow, for since the correlation between E. Q. and I. Q. is not unity (and the reviewer sees no reason why it *should* be) the above relations follow from the statistical fact of "regression." The assumption behind the "push vs. ignore" interpretation is that if all children were equally motivated, then the correlation between E. Q.'s and I. Q. would be unity. Such an assumption involves the acceptance of a monarchic faculty, "general ability," with a capital G.

An excellent review of individual and group tests is given with a critical account of errors of administration and how to avoid them. Skeptically viewed are group tests as measures of intelligence, they being too adulterated by "intellect" and the speed factor. Much evidence is presented showing that the many group tests labelled with "intelligence" are *universally* poorly normed.

Withal, the author takes a healthy pragmatic view of intelligence tests, considering them as rather crude diagnostic devices but nevertheless important adjuncts to the estimation of the individual's placement on the author's postulated biological continuum, "intelligence."

ROBERT C. TRYON
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LURIA, A. R. *The Nature of Human Conflicts or Emotion, Conflict and Will: An Objective Study of Disorganization and Control of Human Behavior.* Translated from the Russian and Edited by W. Horsley Gantt. (New York: Liveright, Inc., 1932), pp. xvii + 431.

This is an account of research carried on at the State Institute of Experimental Psychology, Moscow, between 1923 and 1930, directed toward the investigation of emotion, conflict, and the control of behavior.

The first two topics were explored by means of an ingenious extension of the Jung association technique. With each hand on a bulb which registered the pressure the subject was directed to press the right hand bulb as he made his verbal response. Students about to appear before a board of inquiry to determine their right to continue in the University, persons very recently arrested for murder, hypnotized subjects in whom conflicts had been established by suggestion, and normal controls made up the experimental material. The interest of the experimental results was thus not dependent only on the original extension of the association technique, but also on the fact that the subjects manifested states of emotion seldom before available in the laboratory.

The presence of affect, general or specific to a stimulus was betrayed not only by response time and the character of the verbal response, but by tremors of either hand, false or uncontrolled movements of the hands, or other form of disorganization of the response.

In normal subjects stable and regular movements of the hand could be readily connected with verbal response in two or three trials. In a group of 16 recently arrested murderers and 11 murder suspects the motor reaction was highly unstable, the subject "forgetting" to give it at all or responding with irregular pressures. Departures from normal motor response prove to be highly significant

additions to the usual "complex indicators" of an association test.

In the opinion of the author the affect indicated by the disorganization of the motor response arises at the point of motor conflict and interference, and disappears where action permits the direct discharge of motor impulses. In a calm subject quietly working at a task foreign excitation meets a protective inhibition. In such a subject confronted with a choice, action is inhibited until it is prepared and integrated, and is then released. In the subject without a protective inhibition motor conflict and disorganization appear. This quiet preparation for action in the normal subject Luria calls a "functional barrier" and the disorganization of behavior is connected with the failure of this barrier to separate action from the original excitation. This failure occurs in the case of the criminals, in the students confronted with the board of inquiry, in subjects with artificial conflicts induced under hypnosis, in the psychoneuroses, and in children. With Luria's technique the failure of the barrier may be registered by motor effects in the passive hand even when not shown in the movements of the active hand.

Experiments on choice reactions show that this "functional barrier" is not yet developed in children and that their choices are settled by immediate and confused action, while the choice of an adult exhibits a stage of "quiet" preparation and the subsequent action when it occurs is smooth and integrated. This "functional barrier" so essential to successful choice Luria relates not to neural structure but to an origin in culture. It appears "about the time of the development in the child of the active organization of speech." Work with aphasic subjects indicates that the control of behavior is essentially a function of speech.

Few recent published accounts of research have attacked such important problems in human behavior. Citations are mainly German and Russian. In spite of one of the clearest statements so far written of the dangers of explanation in terms of brain morphology and synapses there is a strong tendency as in Pavlov's writing to speak as though the cortex were the object of the observations and not hand movements. The changes recorded on the kymograph are throughout the book referred to as neurodynamical. Emphasis of this point would be, however, misleading because the author has reported an impressive amount of objective new information concerning human behavior.

The translation has left a considerable number of sentences unclear, and many features of the numerous figures are not adequately explained or marked.

E. R. GUTHRIE
University of Washington

RUGG, HAROLD. *The Great Technology: Social Chaos and the Public Mind.* (New York: The John Day Company, 1933), pp. xiv + 308.

Before one can read Harold Rugg's new book, "The Great Technology," one has to tear off a yellow band with which it is bound around, on which is printed this label: "This is not a book on Technocracy." But judging by the date when it was printed, Feb. 20, 1933, it must have come off the press at about the time when the Technocracy furor was in full blast. Naturally the reader's curiosity is piqued with some inquiry as to what relation it does hold to Technocracy. And it takes some time to shake off that curiosity. The first chapter begins with the

caption: "The End of An Epoch," and the first half dozen chapter titles sound as if they might be from a book by some ghost of Thorstein Veblen. Among a list of authorities enumerated on an early page is included one of the classics of last winter: Howard Scott. And on the same page Rugg remarks: "We are not concerned here about the exact dollar equivalent of that standard (of living available to each adult, working 660 hours per year), whether it would be $20,000 per person per year or $10,000 or $5,000. The important fact is that for the first time in history a whole nation has an economy of plenty. Every once in a while, during the first 200 pages, the reader finds Rugg committing himself quite dogmatically to something or other, on the ground that he has, as he says, become convinced of it. Nevertheless the book is replete with statistical tabulations. Whereupon one pricks up his ears, anticipating some new "climate of public opinion," and begins at once to wonder whether it will turn out to bear the earmarks of John Dewey, or Howard Scott, or Franklin Roosevelt; not that it matters much beyond the probability of a consensus emerging.

During the last one hundred pages this book is reminiscent of "The Child Centered School," except that there is here an apparent tendency to substitute 'circumference' for 'center' as the dominating metaphor. In fact Rugg now complains that mere literacy is too restricted an objective for the school. Too many of us have been trying, through the use of that objective, to make nice white collared gentlemen out of our sons, until it is now apparent that there are not enough of that kind of jobs to go around. So Rugg is beginning to suggest that the entire range of civilized culture is the only suitable circumference for elementary education. So the problem now is to educate teachers who will know enough to educate our grandchildren.

This is a book for the education of a new era. Rugg accordingly thinks in terms of new categories; he aspires to be conspicuously one of the pathbreakers of the new educational thought. For that will be required a new philosophy of life and education.

ROSS L. FINNEY
University of Minnesota

BROADSHAUG, MELVIN. *Buildings and Equipment for Home Economics in Secondary Schools.* Contributions to Education, No. 502 (New York: Bureau of Publications, Teachers College, Columbia University, 1932), pp. x + 178.

Persons responsible for the planning and erection of school buildings have come to accept as fundamental the principle that buildings should be designed with special reference to the activities they are to house. Standards for space requirements and equipment have been lacking for many activities now generally attempted in secondary schools. This study sets up standards for adequate and desirable plant facilities for home economics. It is one of a series of such studies which have appeared in the past few years.

By means of an analysis of the objectives of home economics education and plant facilities found in a group of selected buildings, the author has developed formulae for determining the amount of space and class units to be provided for a home economics department and has made a rather detailed study of the building and equipment problems involved in providing plant facilities.

The custom of housing the home economics department in a separate cottage

has become rather wide spread, particularly in the southern states. The study takes cognizance of this fact, but proceeds to base all findings on the assumption that such a department is to be located within the school building. Building problems conceivably would be different under the two methods of housing and a valuable addition to the study could have been made if these differences had been pointed out and the relative efficiency and economy of the two methods demonstrated. This would have been especially desirable in view of the fact that the study shows that cottages are generally favored by home economics teachers.

The standards for building specifications were arrived at through inspection of thirty-nine buildings containing improved home economics facilities, through an analysis of state and federal standards, through a study of the theories and experiments reported in current literature, and through interviews with persons responsible for carrying on home economics work. In this way a complete list of details that must be considered in planning and developing plant facilities have been brought together.

The study as a whole will be of practical use to school administrators and architects in planning a school building in which home economics instruction is to be provided. Adequate standards for amount of space, location, type, size, and number of rooms have been evolved.

A complete survey of a given community is essential to the development of a home economics teaching program. The study recognizes the value of such a survey and recommends that the standards used in developing school plant facilities shall conform generally to the home standards of the community.

Duke University A. M. PROCTOR

DRAPER, EDGAR M., AND ROBERTS, ALEXANDER C. *Principles of American Secondary Education.* (New York: The Century Company, 1932), pp. xxxiii + 549.

This volume is one of the series, *The Century Studies in Education,* of which W. L. Uhl is the editor. The book was written primarily for use in undergraduate classes in the training of secondary school teachers. It covers the ground usually included in texts of similar character but with important changes in emphasis on certain aspects.

After devoting the usual amount of space to the historical background and to foreign counterparts of American secondary education, two chapters are devoted to *integration* and *articulation,* problems that have, during the past few years, received more than ordinary attention from national committees and other professional groups. The secondary school pupil, guidance, extra-curricular activities, the curriculum and the staff receive major consideration in the remaining chapters of the volume.

The reference lists accompanying each chapter are well selected as supplementary reading but can hardly be considered a critical bibliography based upon the numerous research studies now available to the writers of textbooks in the field.

The volume is well organized and well written and should satisfy the demand for a comprehensive text for undergraduate courses in secondary education.

E. D. GRIZZELL

University of Pennsylvania

RESEARCH ABSTRACTS and BIBLIOGRAPHIES

Address all communications relative to research abstracts and bibliographies to A. S. Barr, University of Wisconsin, Madison, Wisconsin.

BULLETINS

"Abstracts of Unpublished Masters' Theses, Indiana State Teachers College, 1933," *Teachers College Journal*, IV, Section 1 (Terre Haute, Indiana: Indiana State Teachers College, 1933), 43 pp.

Abstracts of unpublished masters' theses of Indiana State Teachers College from August, 1932, to June, 1933.

BACHMAN, FRANK P. *Education and Certification of Elementary Teachers*, Field Study No. 5 (Nashville, Tennessee: Division of Surveys and Field Studies, George Peabody College for Teachers, 1933), x + 223 pp.

This bulletin contains chapters on the present status of elementary school teachers, the present certification requirements, other determining factors, differentiated curricula, length of curricula, instructional materials and time allotment, types of teachers colleges, liberal-cultural education of elementary school teachers, the technical education of elementary school teachers, suggested curricula, certification of elementary teachers, and conclusions.

CHAMBERLAIN, LEO M., AND MEECH, L. E. *The Graduate of the College of Education and the Depression*, Bulletin of the Bureau of School Service, VI, No. 1 (Lexington, Kentucky: College of Education, University of Kentucky, 1933), 38 pp.

A follow-up study of 465 prospective teachers graduated from the College of Education, University of Kentucky, June, 1929, to September, 1932.

HILDEN, A. H. *Table of Heinis Personal Constant Values* (Minneapolis, Minnesota: Educational Test Bureau, Inc., 1933), 28 pp.

Heinis offers the personal constant as a substitute for the I. Q. The author of this monograph has computed the Heinis personal constant for the chronological and mental age levels.

PETERS, CHARLES C., AND HARTMANN, GEORGE W. *Abstracts of Studies in Education at the Pennsylvania State College*, Part III, Penn State Studies in Education, No. 8 (State College, Pennsylvania: School of Education, Pennsylvania State College, 1933), 80 pp.

A lithoprint bulletin supplying abstracts of 40 studies in education at the Pennsylvania State College.

POOLEY, ROBERT C. *Grammar and Usage in Textbooks on English*, Bureau of Educational Research Bulletin, No. 14 (Madison, Wisconsin: Bureau of Educational Research, University of Wisconsin, 1933), 172 pp.

Following a discussion of the development of the prescriptive idea during the nineteenth century, the author presents

an analysis of sixteen widely used textbooks in grammar and composition relative to grammar, syntax, and usage.

SEGEL, DAVID. *National and State Coöperative High-School Testing Programs*, Bulletin No. 9 (Washington: United States Department of Interior, Office of Education, 1933), 47 pp.

The author presents a survey of state and national coöperative high-school testing programs with suggestions for the improvement of such programs.

STANTON, HAZEL M., AND KOERTH, WILHELMINE. *Musical Capacity Measures of Children Repeated after Musical Training*, University of Iowa Studies, Series on Aims and Progress of Research, No. 42 (Iowa City, Iowa: University of Iowa, 1933), 48 pp.

A study of a re-test score in the Seashore measures of musical talent, after from three to nine years of musical training in the Eastman School of Music, University of Rochester, Rochester, New York. The stability of the results revealed in these studies of re-tests emphasizes the real scientific value of the Seashore measures of musical talent. The scores of these tests were found to remain fairly constant over a long period of time regardless of the quality and quantity of musical training.

EXPERIMENTAL STUDIES OF LEARNING AND TEACHING

ELDERTON, MARION. "An Experiment in Map Scoring and Mental Imagery Tests," *Journal of Applied Psychology*, XVII (August, 1933), pp. 376-406.

This experiment was devised to determine possible relationships between differences in imaginal type, as determined by certain tests of imagery and the ability to draw a familiar outline map from memory. The abilities involved in the drawing of maps were not significantly related to those involved in the imagery tests as administered and scored in this experiment.

GATES, ARTHUR I., AND BENNETT, CHESTER C. "Two Tests versus Three Tests Weekly in Teaching Spelling," *Elementary School Journal*, XXXIV (September, 1933), pp. 44-49.

An experimental investigation in which the authors found the two-test plan superior to the three-test plan.

TRAXLER, ARTHUR E. "Group Corrective Reading in the Seventh Grade—An Experiment," *School Review*, XLI (September, 1933), pp. 519-530.

From a series of three experiments with seventh-grade classes in corrective reading, the author found that the pupils made significant gains in corrective classes.

CURRICULUM RESEARCH

BROOM, M. E., AND BRAMKAMP, JOSEPHINE D. "A Study of Factors Contributing to School Citizenship," *Journal of Applied Psychology*, XVII (August, 1933), pp. 459-467.

From a study of 122 seventh and eighth grade pupils in the rural schools of Imperial county, California, the authors found that mental ability above the average, low emotional affectivity, emotional stability, and introversion constituted the combination of traits for school citizenship.

NORTH, CECIL C., AND OTHERS. "The Introductory Course in Sociology in Colleges and Universities," *Journal of Educational Sociology*, VII (September, 1933), 82 pp.

The September issue of the *Journal of Educational Sociology* is given over to a series of articles relating to the organization of introductory courses in sociology in colleges and universities.

MEASUREMENTS, STATISTICS AND THE METHODOLOGY OF SCIENTIFIC RESEARCH

DRAKE, RALEIGH M. "The Validity and Reliability of Tests of Musical Talent," *Journal of Applied Psychology*, XVII (August, 1933), pp. 447-458.

The author presents data pertaining to the relative validities and reliabilities of some twenty tests of musical talent. Only the three tests: musical memory, pitch, and tonal memory by Seashore were found to have satisfactory coefficients of both validity and reliability.

HILDEN, ARNOLD H. "A Comparative Study of the Intelligence Quotient and Heinis' Personal Constant," *Journal of Applied Psychology*, XVII (August, 1933), pp. 355-375.

The author presents data pertaining to the relative constancy of the I. Q. and the Heinis Personal Constant. The latter is found to be more constant.

REED, A. A., AND WEIDEMANN, C. C. *A Social Situation Judgments Test—Form I (Experimental)*, Educational Research Record, Vol. V, No. 102, University of Nebraska Publication (Lincoln, Nebraska: University of Nebraska, 1933), pp. 10-17.

The authors present selected examples of a social situation judgment test, with a distribution of scores for teachers college students.

STRONG, EDWARD K., JR.. "Interest Maturity," *Personnel Journal*, XII (August, 1933), pp. 77-90.

The author presents a considerable amount of statistical data relative to interest maturity. Interest maturity has reference to which one has the interests of a 55-year-old man of superior education and occupational attainment in contrast to a typical 15-year-old boy. The reliability of the scale is about .95.

TINKER, MILES A. "Use and Limitations of Eye-Movement Measures of Reading," *Psychological Review*, XL (July, 1933), pp. 381-387.

From a survey of published investigations the author concludes that the recording of eye-movements has become fairly common and a very useful method of studying reading performance.

WILLIAMS, EULA S. "A Personality Rating Form for Elementary School Pupils," *Elementary School Journal*, XXXIV (September, 1933), pp. 16-29.

The author presents a personality rating blank used in the University of Chicago Elementary School.

MISCELLANEOUS

BERMAN, ISABEL R., AND BIRD, CHARLES. "Sex Differences in Speed of Reading," *Journal of Applied Psychology*, XVII (June, 1933), pp. 221-226.

The authors present a summary of previous investigations and the results of their own investigation in which they find

that the average woman reads faster than the average man.

BRUECKNER, LEO J. "Selected References on Elementary-School Instruction, I," *Elementary School Journal*, XXXIV (September, 1933), pp. 58-66.

A selected bibliography on curriculum, methods of teaching and study, and supervision.

HUTSON, PERCIVAL W. "Selected References on Guidance," *School Review*, XLI (September, 1933), pp. 539-546.

Selected references on guidance appearing during the period from April 1, 1932, to May 31, 1933.

PENROSE, L. S. "A Study in the Inheritance of Intelligence," *British Journal of Psychology*, XXIV (July, 1933), pp. 1-15.

A study of 100 families containing subcultural mental defectives in which the author accounts for the likenesses on the assumption of alternative additive Mendelian genetic factors, a noticeable proportion of which are sex linked.

NEW TESTS

BARR, A. S., AND DAGGETT, C. J. *Information Tests in American History*, Forms A and B. Minneapolis, Minnesota: Educational Test Bureau, Inc., 1933.

These tests contain tests of historical terms in context, the importance of events, men-event relationships, chronological facts, causal relations, and present day problem relationships.

GREENE, H. A., AND KELLEY, V. H. *Iowa Silent Reading Tests:* Elementary Tests. Yonkers-on-Hudson, New York: World Book Company, 1933.

There are two forms to this test designed to measure reading in actual reading situations. The results are expressed in terms of specific skills so that the correction may be directed toward specific weaknesses.

WESLEY, EDGAR BRUCE. *Wesley Test in Political Terms*, Forms A, B, C and D. New York City: Charles Scribner's Sons, 1932.

There are four forms to measure achievement in political science. These tests were constructed for the Commission on the social studies of the American Historical Association.

WESLEY, EDGAR BRUCE. *Wesley Test in Social Terms*, Forms A and B. New York City: Charles Scribner's Sons, 1932.

These tests are designed to measure achievement which is the result of instruction in economics, government, history, and sociology.

RESEARCH NEWS and COMMUNICATIONS

Address all research news and communications to Carter V. Good, Teachers College, University of Cincinnati, Cincinnati, Ohio.

Authoritative Statements of Accomplishment in Given Fields.—Valuable orientation with respect to the status of research in many fields of education is provided by stimulating discussions in current periodicals. Such overview treatments reveal to the worker the foundation on which he builds in carrying forward his own activities in the same field.

The biennial survey of education, issued by the United States Office of Education, provides the best available information concerning the present status of education of the various types and at the several levels of instruction: administration and finance, elementary, secondary, industrial, commercial, home-making, agricultural, art, music, hygiene and physical education, exceptional children, adult, college and university, indigenous peoples, radio, research, libraries, boards and foundations, museums, and legislation.

The *Review of Educational Research* is devoted entirely to summaries of the investigations completed in the various fields of education.

Space does not permit a listing of the numerous bibliographies and summaries dealing systematically with special problems in education. Among these aids are especially thorough summaries in reading; language, grammar, and composition; the English curriculum; arithmetic; and science.

Among the broader characterizations of research accomplished, which do not pretend to be systematic or extensive bibliographical analyses of educational literature, are:

Bernard, L. L., and Bernard, J. S. "A Century of Progress in the Social Sciences," *Social Forces*, XI (May, 1933), pp. 488-505.

Bridgman, R. P. "Ten Years' Progress in Parent Education," *Childhood Education*, VII (January, 1931), pp. 240-56.

Douglass, H. R. "The Contribution of Research to Secondary School Curriculum Construction," *School and Society*, XXXII (September 27, 1930), pp. 411-16.

Freeman, F. N. "The Contribution of Science to Education," *School and Society*, XXX (July 27, 1929), pp. 107-12.

Freeman, F. N. "The Contribution of Science to the Principles and Methods of Teaching," *Childhood Education*, VI (April, 1930), pp. 348-54.

Gates, A. I. "Recent Advances in Educational Psychology," *School and Society*, XXIX (January 5, 1929), pp. 1-8.

Gates, A. I. "Contributions of Psychological Research to Education," *School and Society*, XXXI (April 12, 1930), pp. 485-93.

Shuttleworth, F. K. "A Decade of Progress in Methods of Measuring Character," *Journal of Educational Sociology*, IV (December, 1930), pp. 233-41.

Smith, W. R. "Recent Progress of Educational Sociology," *Journal of Educational Sociology*, III (April, 1930), pp. 450-55.

Strayer, G. D. "Progress in City School Administration During the Past Twenty-five Years," *School and Society*, XXXII (September 20, 1930), pp. 375-78.

Symonds, P. M. "The Contribution of Research to the Mental Hygiene Program for Schools," *School and Society*, XXXIV (July 11, 1931), pp. 39-49.

White, W. A. "The Origin, Growth, and Significance of the Mental Hygiene Movement," *Science*, LXXII (July 25, 1930), pp. 77-81.

Wiley, G. M. "The Contribution of Research to the Organization of Secondary Schools," *School and Society*, XXXI (April 19, 1930), pp. 517-22.

Womrath, G. F. "Public School Business Administration in the Past Forty Years," *American School Board Journal*, LXXXII (March, 1931), pp. 43-44, 118.

Illustrative Critiques of Given Fields.—Occasional discussions of investigational results secured, techniques employed, or shortcomings in certain areas of activity reveal to the worker gaps in the available information which should be closed up by the results of further study. Examples of such analyses are:

Curtis, F. D. "Some Reactions Regarding the Published Investigations in the Teaching of Science," *School Science and Mathematics*, XXVII (June and October, 1927), pp. 634-41, 710-20.

Davis, R. A. "Research and the Schools," *Journal of Educational Research*, XXVI (April, 1933), pp. 561-68.

Gambrill, Bessie L. "A Critical Review of Researches in Supervision," *Educational Administration and Supervision*, XV (April, 1929), pp. 279-89.

Harap, Henry. "A Critique of Public School Courses of Study 1928-1929," *Journal of Educational Research*, XXI (February, 1930), pp. 109-119.

Harap, Henry, and Bayne, Alice J. "A Critical Survey of Public School Courses of Study Published 1929 to 1931," *Journal of Educational Research*, XXVI (October, 1932), pp. 105-09.

Hissong, Mary C., and Hissong, Clyde. "The Scientific Movement and Progressive Education," *Education*, LI (September, 1930), pp. 1-9.

Hullfish, H. G. "A Crucial Problem for Philosophy of Education," *Educational Administration and Supervision*, XVI (April, 1930), pp. 241-48.

Hutchins, Robert M. "The American Educational System," *School Review*, XLI (February, 1933), pp. 95-100.

Judd, Charles H. "In Defense of American Secondary Schools," *School Review*, XLI (April, 1933), pp. 257-65.

Judd, Charles H. "The Scientific Development of the Curriculum," *Elementary School Journal*, XXXIII (April, 1933), pp. 577-591.

Myers, Alonzo F. "An Evaluation of Research on Teacher Preparation," *Journal of Educational Research*, XXVI (November, 1932), pp. 161-74.

Odell, C. W. "Educational Measurement in the Secondary School," *Journal of Educational Research*, XXVI (October, 1932), pp. 81-9.

Riedel, F. A. "What, If Anything, Has Really Been Proved as to the Relative Effectiveness of Demonstration and Laboratory Methods in Science?" *School Science and Mathematics*,

XXVII (May and June, 1927), pp. 512-19, 620-31.

Analyses of Educational Trends.—Critical insight with respect to current problems and familiarity with changes in education are promoted through examination of articles dealing with trends in given fields. Most educational journals feel obligated to prepare occasional analyses of such changes in the areas represented. A method employed rather frequently in discovering shifts of emphasis is to analyze journals over a period of years. Twenty-three addresses delivered at the twenty-fifth anniversary of the College of Education, University of Minnesota, picture changes occurring during the twentieth century. Other illustrative analyses of educational trends deal with the teaching of mathematics, character education, and personnel research.

Becker, H. P. "Distribution of Space in the *American Journal of Sociology*, 1895-1927," *American Journal of Sociology*, XXXVI (November, 1930), pp. 461-66.

Fawcett, Mark. "A Comparison of the Educational Problems of 1910 and 1926, as Revealed by Educational Magazines." Unpublished Master's thesis, University of Chicago, 1928.

Significant Changes and Trends in the Teaching of Mathematics throughout the World since 1910. Fourth Yearbook of the National Council of Teachers of Mathematics. New York: Teachers College, Columbia University, 1929. pp. x + 186.

Strang, Ruth. "Trends in Educational Personnel Research," *Personnel Journal*, X (October, 1931), pp. 179-88.

The Changing Educational World, 1906-30. Edited by Alvin Eurich. Minneapolis: University of Minnesota Press, 1930. pp. 312.

Wiley, S. W. "Recent Trends in Character Education," *Religious Education*, XXVI (April, 1931), pp. 346-54.

Educational Prophecies.—Current literature contains interesting predictions of future developments in education. Examination of such prophecies offers suggestions concerning research which must be accomplished before the predictions made can be realized.

Members of the Department of Education, University of Chicago, in 1931 placed in the corner stone of their new building prophecies of the status of education in 2031. The predictions are as follows:

"Careful comparative reading of the prophecies discloses considerable recurrence of similar elements. One of the predictions most frequently emerging pertains to the status of the science of education. One writer goes so far as to anticipate that in a hundred years scientific knowledge regarding education will supplant entirely appeal to personal authority. This type of prediction is often associated with one relating to concurrent development of a science of society or of human nature. Other elements of frequent recurrence refer to the extension of opportunities of universal education, adult education, the curriculum, individualization, and school organization. Popularization of education will be carried to higher age levels, and the recent movement for continuous education through adulthood will have moved toward universalization. The curriculum will have been modified in a number of ways, including more attention to cultural and non-vocational phases on levels

below the professions. The organization of schools promises to include three levels: an elementary period (certain prophecies also mentioning nursery-school developments), a secondary period that will extend to the end of general education and displace the four-year college, and the university proper. Among elements recurrently but less frequently mentioned than those listed are improved procedures in teaching (refined through experimentation), programs of guidance, and improved articulation of the system of schools. A number of predictions are mentioned once or twice only, among them several of a non-educational character, such as progress toward a universal language, the disappearance of common labor, and the displacement of the state as a governmental unit."

Illustrative forecasts, including the Chicago prophecy, are:

Bode, Boyd H. "The Most Outstanding Next Steps for Curriculum Makers in the United States," *Teachers College Record*, XXX (December, 1928), pp. 179-91.

Briggs, T. H. "A Vision of Secondary Education," *Teachers College Record*, XXXIV (October, 1932), pp. 1-17.

Burton, W. H. "Probable Next Steps in the Progress of Supervision," *Educational Method*, IX (April, 1930), pp. 402-6.

Harap, Henry. "Next Steps in Curriculum-Making," *Elementary School Journal*, XXXI (September, 1930), pp. 16-24.

Harap, Henry. "Next Steps in Curriculum-Making for Home Economics," *Journal of Home Economics*, XXI (August, 1929), pp. 570-76.

Hopkins, L. T. "Prospects for Progress in Home Economics Education," *Journal of Home Economics*, XXIII (February, 1931), pp. 117-23.

Hughes, W. H. "Research and Public Education in 1950," *Nation's Schools*, VI (July, 1930), pp. 21-24.

Members of the Department of Education, "Education in the Year 2031," *School Review*, XXXIX (May, 1931), pp. 337-49.

Morgan, Joy Elmer. "Twenty-Five Years of Prophetic Achievement," *Journal of the National Education Association*, XX (May, 1931), pp. 147-48.

Robertson, C. G. "Educational Development, 1831-1931: A Centenary Survey and a Forecast," *School and Society*, XXXIV (October 3, 1931), pp. 445-58.

Sadler, Sir Michael. *The Outlook in Secondary Education*. New York: Teachers College, Columbia University, 1930. pp. 56.

Snedden, David. *American High Schools and Vocational Schools in 1960*. New York: Bureau of Publications, Teachers College, Columbia University, 1930. pp. 56.

Touton, F. C. "Education in 1940," *Education*, LIII (March, 1933), pp. 428-35.

Coördination of Research in New York State.—In various ways efforts are being made to coördinate educational research activities in New York State. Many of these have been developing over a period of years.

Of the state-wide agencies aiding in this coördination may be mentioned first the Committee on Coöperation in Educational Research, of which George D. Strayer, Teachers College, Columbia University is chairman. This committee was an outgrowth of an educational research conference held at Albany in March, 1931. The committee has attempted to survey

educational needs in New York State and to formulate statements concerning educational research most needed. Two pamphlets bearing this title, "Needed Educational Research," have been published. These have been of help to graduate students and others in selecting problems for investigation. The committee also has met with the cabinet of the Commissioner of Education to discuss needed research.

The second state-wide agency is the Educational Research Association of New York State of which Julian E. Butterworth, Cornell University, is president. The principal activity carried on by this association is a yearly meeting during the Christmas holidays at which research studies are reported.

A third agency which has helped in this work is an informal organization of members of Phi Delta Kappa, of which Milton G. Nelson, State College for Teachers, Albany, is chairman. Two and sometimes three meetings are held each year at which some piece of research usually is reported and discussed.

In recent years a number of the educational organizations of New York State have appointed committees with general responsibility for conducting research or with instructions to study some particular topic.

The Associated Academic Principals have had such a committee on secondary-school problems for more than five years. It has sponsored a number of studies, all leading to desirable reorganization of secondary education. The influence of this committee has been considerable.

The New York State Teachers Association has appointed various committees to study special problems. One such committee sponsored an exhaustive study of pre-service and in-service training of elementary-school teachers and published the results of the work as Educational Monograph No. 2. Another committee is the Fact Finding Committee whose purpose is to make available to teachers important data relative to the position of education in the present depression.

The Council of School Superintendents has a committee on policies of educational finance which is contemplating several research studies.

The New York State Association of District Superintendents has appointed a permanent committee on research, made up of all former presidents. This committee decides upon a piece of research which it wishes done and then selects a committee to carry it forward. At the present time studies are being made of the status of the district superintendent. One study reviews the history of the administration and supervision of rural schools of New York State; another summarizes the administration of rural schools in other states; and a third reports in some detail data concerning the supervisory district as an administrative and supervisory unit.

The New York Association of Elementary Principals has sponsored, through committees, a number of research studies, some of which have been published through the financial resources of the Association.

The Educational Research Division of the State Education Department has been called in frequently to assist these various agencies in carrying forward their research problems. It also has been instrumental in carrying on certain other activities which have aided in the coördination of research. It has organized two educational research conferences to which representatives of teacher-training institutions and of research bureaus in

public schools were invited. The last such conference was held on May 1, 1933. The program of this conference brought in men from fields allied to education, who discussed problems which were related to both their own fields and to education. The Research Division also has prepared a "Bibliography of Educational Research Studies Pertaining to New York State." In this bulletin an attempt was made to discover unpublished Masters' and Doctors' theses which might be valuable to those who were confronted with local problems. Various members of the State Education Department staff are consulted from time to time by graduate students with regard to choice of thesis subjects, investigational procedures, and sometimes with regard to aid in collecting data.

It is difficult to appraise the general movement for coördination of research, partly because it is too recent, but partly because the results are not always tangible. Judging by conversations with educational workers, one is probably safe in saying that problems selected for study of late have become of more immediate practical value in helping to solve issues faced by the public schools of the state. It is probably safe to say that more people have been stimulated to carry on studies than ever before. It is difficult to say whether the quality of research has improved. Even though much work is still of poor quality, more studies of recognized value are now available, which can be translated into a change of policy or practice.

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Needed Research in New York State.—The State Education Department of New York, through its appointed committee on Coöperation in Educational Research, has issued a bulletin listing sixty-three state problems in need of investigation. The chairman of the committee, G. D. Strayer of Columbia University, makes a significant statement in the Foreword concerning research:

"It has been quite convincingly argued that education lags behind social progress; that it never is in the van pointing the way to desirable social changes. It is, therefore, considered the conserver of the progress of civilization. To what extent education can and should lead the way instead of following is a matter of controversy. But whether education must always lag or will sometime lead, it is essential that it be in close touch with social movements, continually selecting those things which should be made a part of the training of the young. In the process it must be willing to discard subjects and practices which have the sanction of tradition but which have little present value, and organize new procedures.

"Although we are so close to present trends that to make a correct analysis is difficult, there never was a time when it was so necessary. In the last quarter of a century there have been rapid social and economic changes which have not been unfelt in the field of education. In general, however, education has attempted to improve itself from within by perfecting its teaching methods, by analyzing its curriculums, and by improving its organization but has not been alert to its relationships to present-day society.

"The Committee on Coöperation in Educational Research believes that more studies should be made analyzing the educational implications of recent changes. The committee agrees that already at

least one problem has emerged which is in need of careful study, namely: What is a desirable and practicable size of administrative unit for education?

"This problem is pressing for an answer for two outstanding reasons: (1) the mounting costs of education are making it necessary to determine the most efficient size of educational unit; and (2) the ever-increasing complication of living conditions and the increasing need for guidance are making it necessary greatly to enrich the offering of the school over the offering of a generation ago, thus demanding larger school units than have been known, at least, in our smaller communities. The reorganization of school administrative units is suggested as the problem most in need of study at the present time. Many of the suggestions made in this bulletin touch upon certain phases of this topic; others of equal importance will doubtless occur to the reader."

School Building Yearbook.—During the February meeting of the Department of Superintendence, the Committee on the School Building Yearbook of the National Society for the Study of Education held several conferences and developed the final outline for the Yearbook's contents. The material of the volume will be divided into seven parts: philosophy of the school plant; school plant planning policies; educational services, national, state, and local, in the development of the school plant; character of the professional services utilized in the development of the school plant; services involved in construction; some of the financial problems of school plant planning; and bibliographies. Work on the yearbook is being done by a group of specialists, in addition to the committee, of which Dr. N. L. Engelhardt of Columbia University is chairman.

New Physics Journal.—The American Physics Teacher, the initial number of which appeared in April, 1933, is a new quarterly journal sponsored by the American Association of Physics Teachers. It is an addition to the list of seven periodicals which the American Institute of Physics now publishes. The new journal will feature articles on physics teaching and related problems, with departments devoted to discussion, laboratory and demonstration apparatus, and abstracts. The editor is Dr. Duane Roller, associate professor of physics at the University of Oklahoma. The subscription price of three dollars a year includes subscription to the *Review of Scientific Instruments,* a journal sent to all who subscribe to publications of the American Institute of Physics.

Conferences on the National Survey of Secondary Education.—A considerable number of conferences concerning the National Survey of Secondary Education have been held during the past year. Among the agencies which have conducted or scheduled such presentations are:

Columbia University, Conference on Secondary Education, July, 1932.

Virginia State Education Association, November, 1932.

University of Illinois, Conference of High School Principals, November, 1932.

Middle States Association of Colleges and Secondary Schools, November, 1932.

Southern Association of Colleges and Secondary Schools, December, 1932.

Pennsylvania State Education Association, December, 1932.

Headmasters Association, February, 1933.
Department of Secondary School Principals of the National Education Association, February, 1933.
North Central Association, April, 1933.
University of Pennsylvania Schoolmen's Week, April, 1933.
Northwest Association of Secondary and Higher Schools, April, 1933.
Department of Secondary Education of the National Education Association, July, 1933.
University of Alabama Summer Conference, July, 1933.
George Washington University Summer Conference, July, 1933.
George Peabody College for Teachers Summer Conference, July, 1933.
Virginia Committee for Research in Secondary Education, August, 1933.

All responsibility in connection with the conferences has been assumed by the agencies holding them. The Office of Education has coöperated to the best of its ability in planning and conducting the programs, but such matters as initiation, announcements, expense, and follow-up plans, if any, have in every case been the concern of the agency calling the meeting.

Some of the organizations, it will be observed, operate on a state-wide basis. Fully half of them operate nationally or regionally within the nation. At a recent meeting of the National Committee on Research in Secondary Education it was suggested that not only more of the state organizations but also numerous other agencies, such as summer sessions of higher institutions and educational associations operating sectionally within states, might find it appropriate to include presentations of the Survey in their programs.

The amount of program time given to the Survey by these several agencies has varied from one to seven or eight presentations. Significant types of programs are:

1. The Columbia University Conference on Secondary Education had one presentation on the Survey as a whole by a member of the directional staff and discussions of four major reports of the Survey by the four specialists in charge of these projects. In addition twelve other speakers appeared on the programs of the conference.

2. The Virginia State Education Association, the Middle States Association of Colleges and Secondary Schools, and the Headmasters Association each had one presentation on the Survey delivered in each case by a member of the directional staff. The Southern Association of Colleges and Secondary Schools had two program numbers on the Survey, both by members of the directional staff.

3. The Department of Secondary Education of the National Education Association scheduled a full session of its July meeting around the topic "The Changing Curriculum of the Secondary Schools." All programs of this session dealt with the National Survey of Secondary Education. A general meeting was addressed by a member of the directional staff, after which six or more sectional meetings were each addressed by specialists who were in charge of Survey studies in the several subject-matter fields.

4. The University of Alabama Summer Conference scheduled one program appearance on each of five successive days by the director of the Survey.

5. During Schoolmen's Week at the University of Pennsylvania there were included among the extensive programs of this organization five or six presentations on the Survey. One of these was by a

member of the consultant staff, and the others by members of the specialist staff who reported on individual studies directed by themselves.

6. The Northwest Association of Secondary and Higher Schools had full programs for a morning and an afternoon session dealing with the Survey. Commissioner Cooper was in charge. Assisting him as conference leaders there were three members of the professional committee of the Survey and a high school principal from Northwest Association territory who had no official connection with the Survey. Each of the conference leaders reported on one of the Survey studies.

Bibliography on School Finance.—Bulletin No. 15, 1932, of the U. S. Office of Education is a bibliography on school finance covering 1923-1931. It is a part of the work of the National Survey of School Finance and was prepared by Carter Alexander and Timon Covert. The Foreword describes aptly the purpose of the bibliography.

"This bibliography, conceived as one of the earliest undertakings of the survey, does for the materials published from 1923 to 1931 what the Educational Finance Inquiry's bibliography did for the earlier years. In addition it lists some good mimeographed materials and some unpublished references whose titles seem promising. The time limitations and tremendous growth of the literature of the field, however, have made it impossible to cover all references as thoroughly as in the earlier work. Annotations and references are less complete for the same reasons.

"Like the earlier bibliography, this one aims to stimulate school executives and research workers to progress in financing education. In a way each heading in the bibliography represents one or more problems in school finance. Nearly every important heading opens and plainly marks new and easy highways to representative data, ideas, statistics, and descriptions of practice essential for sound solutions of the problems involved. Accordingly the bibliography endeavors to include only usable materials. It makes no effort to provide under a given head all the references which a specialist working in that one field for the time expended on this whole bibliography could assemble.

"The very fact that some headings have a paucity of materials is a challenge to school finance men everywhere. For every such empty place means that very little has been done in that field to put it on a sound financial basis. Until the financial aspects of any phase of education are sufficiently understood and controlled, it can never hope to become an integral part of the accepted educational program, public or non-tax-supported. The vacant headings therefore offer rich opportunities for exploration. Every such study of merit should be promptly published or at least circulated in mimeographed form."

Unpublished Bibliographies on Interests.—C. L. Nemzek of the University High School, University of Minnesota, Minneapolis, has available certain unpublished typed bibliographies in the field of interests which he will lend to interested individuals without charge except for postage. The topics represented are:

"Studies of Interests." Pp. 57. 600 titles.

"Play, Recreational, Leisure, and Avocational Interests." Pp. 15. 112 titles.

"Reading Interest Studies." Pp. 18. 175 titles.

"Studies of Scholastic Interests." Pp. 17. 94 titles.

One Teacher's Experience

Learning to Study and Learning to Use the Power to Study

Superintendent Q., of the schools of Eutopia, turned to one of his brightest teachers with the question: "What is the report from the front line today?" "I have made a discovery," responded Miss S. "There is something in the right use of tests. In three months, thirty of my thirty-three pupils have advanced their reading score from 5% and up to 14% correct for each of the four kinds of reading ability tests given during the first term, to over 90% correct on the harder tests of each kind given this term. The slowest pupil advanced from less than 5% correct on the four first term tests to an average of 25%, and the next slowest to an average of 45% correct. When the slow ones make such an advance, the tests seem to have a power of magic."

"But," queried Superintendent Q., "what about the magic of the teacher?"

"Credit it to the tests," replied Miss S., "for I never had such results before except with the few bright pupils. The magic, as I see it, is in the way the tests help the pupils to learn how to study. Before, only the bright ones learned how to study, now they all have learned, each up to his capacity."

"If that is true, you have made a discovery," said Superintendent Q. "Tell us all about it."

Miss S. thought that the proof of the pudding was in the eating. Nevertheless she described three benefits due to testing of the objective type which she thought aided teachers of today to get better results with the activity programs.

First, she credited the use of the objective form of these tests with fixing clear and definite ideas of the subject for each pupil. After such a test the pupils attack the next lesson "on the flank," as the military man would say, and break it into answerable parts. She found the result much better for most pupils than the old general discussion or essay examination.

Second, she rendered due thanks to the skilled research studies from which the succession of difficulties in each grade in each subject was organized in these tests for study uses. Such an authoritative analysis of